CMS NEWS

Dr A.M. Mathai honored by the UNITED NATIONS

Dr A.M. Mathai is honored by the United Nations at its Quito, Ecuador, Workshop on 8-12 October 2012 for his contribution of the last 25 years to the basic space sciences initiative of the United Nations (UNBSSI). The following is the citation:

UNITED NATIONS
Office for Outer Space Affairs

8 October 2012

Prof. Dr. A.M. MATHAI
McGill University
Montreal, Canada, and
Centre for Mathematical Sciences
Kerala, India

Dear Professor Mathai,

United Nations Basic Space Science Initiative 1991-2012

On behalf of the United Nations Office for Outer Space Affairs (OOSA), I would like to express our deep appreciation for your contributions to the United Nations Basic Space Science Initiative (UNBSSI) since 1991.

It is a particular pleasure for the Office to hand over to you this letter at the occasion of the United Nations/Ecuador Workshop on the International Space Weather Initiative, which is the 20th Workshop of the United Nations Basic Space Science Initiative.

With an attempt to gradually involve all States members of the United Nations, the UNBSSI is a long-term effort for the development of astronomy and space science through regional and international cooperation in this field on a worldwide basis, particularly in developing nations.

Starting in 2010, the UNBSSI workshops focused on the ISWI as mandated in a three-year work plan as part of the deliberations of the Committee on the Peaceful Uses of Outer Space (COPUOS) of the United Nations. Workshops on ISWI were scheduled for Egypt in 2010 for Western Asia, Nigeria in 2011 for Africa, and Ecuador in 2012 for Latin America and the Caribbean. The latter one, held at the Astronomical Observatory of Quito, from 8 to 12 October 2012, reviewed the results of the operation of the instrument arrays and discussed ways and means to continue space weather research and education, particularly focusing on programmes as implemented by the International Centre for Space Weather Science and Education (ICSWSE) at Kyushu University, Fukuoka, Japan. Similar research and education centres were also established in Nigeria and India. The Centre for Mathematical Sciences, under your distinguished leadership, and your personal contributions in terms of mathematics and statistics, have played a critical role to the success of the UNBSSI in the past 25 years.
Thank you very much for your cooperation.

Yours sincerely,

Hans J. Haubold
Office for Outer Space Affairs

The Quito, Ecuador, Workshop was sponsored by the United Nations and co-sponsored/co-organized by the Japan Aerospace Exploration Agency (JAXA), Japan; International Centre for Space Weather Science and Education, Kyushu University, Japan; National Aeronautics and Space Administration (NASA), United States of America; Latin American Center for Physics (CLAF); International Committee on Global Navigation Satellite Systems (ICG); International Astronomical Union (IAU); Committee on Space Research (COSPAR); Scientific Committee on Solar Terrestrial Physics (SCOSTEP); and hosted by Quito Astronomical Observatory of the National Polytechnic School, Quito, Ecuador, on behalf of the Government of Ecuador.

Dr Mathai gave the lead keynote address. The other three keynote addresses were representing the co-sponsoring organizations. The current stage of the work in this area is of the type of collection of data and reporting in the form of graphs and charts. The next stages are proper statistical analysis, model building and prediction. Dr Mathai's talk was on entropic, distributional and differential pathways and model building covering the last two stages of data analysis and model building leading to prediction.
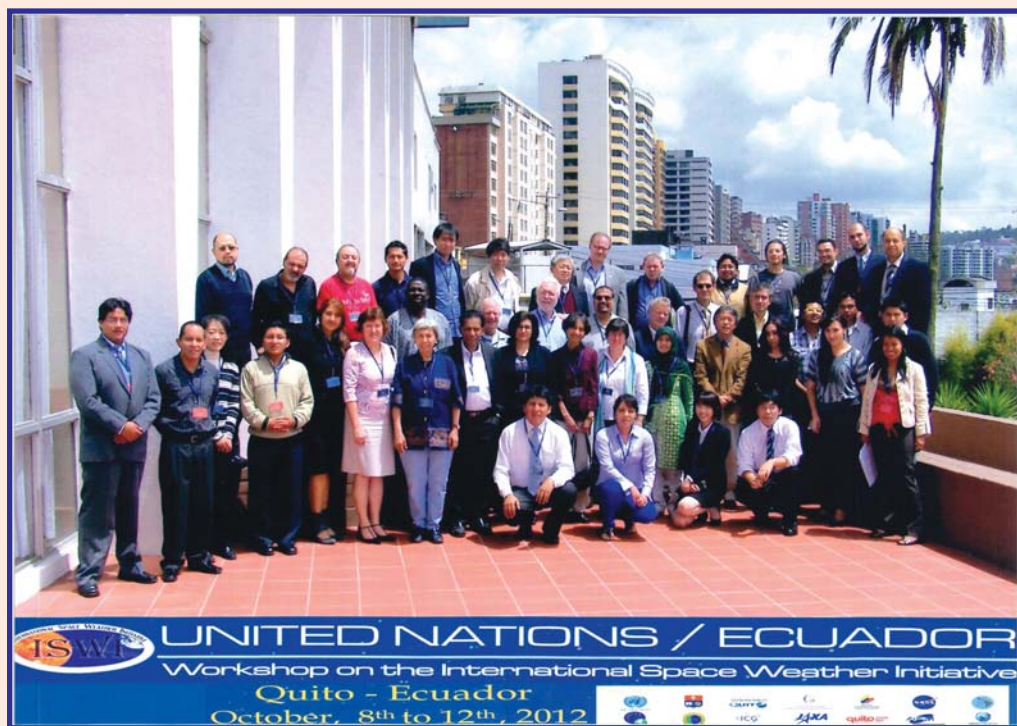
The invitation to Dr Mathai for participation at the Quito Workshop came from Dr Sharafat Gadimova, Chief of the United Nations Program on Space Applications, Office for Outer Space Affairs. Dr Mathai was also invited for the United Nations/Austria Symposium on Data Analysis and Image Processing for Space Applications and Sustainable Development: Space Weather by Lorant Gzaran of the United Nations. Dr Mathai could not participate in this UN/Austria Symposium due to overlap with other programs. After Dr Mathai's lecture at Quito, several students from Ecuador showed interest in coming to CMS, India, for doing their Ph.D's. Two were invited to visit CMS in March-April 2013 and then decide if they find the atmosphere and facilities at CMS suitable for them.

Situations Vacant

CMS has 3 vacant faculty positions at the Assistant Professor level and 2 positions of DST-JRF. For JRF, UGC-NET is compulsory. For faculty positions strong publication record is needed. Apply to Director, CMS at the address on this Newsletter.

Recent publications from CMS

After the appearance of Volume 15, Number 1, 2012 of the Newsletter the following papers are published/accepted by CMS research team:

1. M.A. Pathan (2011): A new class of generalized Bernoulli and Appell polynomials. *South East Asian J.Math.&Math.Sc.*,**10(2)**, 29-39.

2. M.A. Pathan (2011): Application of two variable H-function for obtaining analytic sequence of solutions of three variables space and time fractional diffusion problem. *Bull. Pure Appl. Maths.,* **5(1)**,151-160.

3. H.J. Haubold and A.M. Mathai (2012): An entropic pathway to multivariate Gaussian density, *Mathematica Aeterna,* **2(1)**, 51-61.

4. A.M. Mathai (2012) : Stochastic models under power transformations and exponentiation. *Journal of the Society for Probability and Statistics*, **13**, 1-19.

5. A.M. Mathai (2012) : Generalized Krätzel integral and associated statistical densities. *International Journal of Mathematical Analysis*, **6(51)**, 2501-2510.

6. Y.S. Kim, A.K. Rathie and R.B. Paris (2012): Generalization of two theorems due to Ramanujan. *Integral Transforms and Special Functions* (to appear).

7. A.M. Mathai (2012): On adjacency matrices and descriptors of signed cycle graphs. *Journal of Combinatorices, Information and System Sciences*, **37(2-4)**, 369-382.

8. Naiju M. Thomas (2012): On the ratios of pathway random variables, *Communications in Statistics-Theory and Methods* (accepted).

9. A.M. Mathai and Serge B. Provost: Generalized Boltzmann factors induced by Weibull-type distributions, *Physica A* (to appear).

10. M.A. Pathan (2012): A new class of generalized Hermite–Bernoulli polynomials. *Georgeon Mathematical Journal*, **19(3)**, 559-574.

11. M.A. Pathan (2012): Series solutions for initial-value problem of time fractional generalized anomalous diffusion equations, *Le Matematiche,* **67, Fasc II** , 217-229.

12. M.A. Pathan (2012): Laplace transforms of the logarithmic functions and their applications, *Demonstratia Math.* (to appear).

13. T. Princy (2012): Krätzel distributions and an integral transform. *Communications in Statistics –Theory and Methods*, (to appear).

14. Ashutosh Shukla (2012): Pareto reliability model : A Bayes study under general entropy loss function. Edited volume *"Applications of Reliability Theory and Survival Analysis"* Bonfring Publications, Coimbatore, 79-95.

(b) Papers in refereed conference proceedings

15. A.M. Mathai (2012): Results connecting many areas. *South East Asian J. Math. & Math. Sci.,* **10(2)**(2011), 115-128 [Proceedings of the National Conference on Ramanujan's Works].

Publications by others with acknowledgement to Dr A.M. Mathai for giving help and to CMS for providing facilities

16. Anitha Thomas (2011): On a fractional master equation. *International Journal of Differential Equations*, Vol.2011,ID 346298, 13 pages.

17. Anitha Thomas (2011): Some special functions and fractional Laplace equation, *Indian Journal of Mathematics*, **53(3),** 525-546.

18. Jung Hun Han (2012): One-sided stable distribution, *Intellectual Archive,* **1(3),** 174-184.

Participation in Conferences and Talks given

Dr A.M. Mathai gave three hours of **lectures** on 30th August 2012 to the High School students. Selected students in Mathematics were given three days training at Amal Jyothi Engineering College at Kanjirappally and Dr Mathai and Dilip Kumar (DST-SRF at CMS) were resource persons. The program was also co-sponsored by CMS.

Mr Dilip Kumar also talked to one batch of grades 8-10 students and another batch of grades 11-12 students.

Dr Mathai gave two sequences of three hours each of **lectures** to the first and second year M.Sc students at the Central University of Kerala at its Science Campus at Kanhangad, Kerala, India.

Dr Mathai gave the leading **keynote address** at the United Nations' Workshop held at Quito, Ecuador (South America) on 8-12 October 2012. He was also honored at the same Workshop. Dr Mathai gave an **invited talk**

of 90 minutes on 6th November 2012 at the Workshop on Fractional Calculus held at the Department of Mathematics, University of Pune, India. He gave a lecture to high school students in the INSPIRE program of DST, Delhi, at Assumption College, Changanacherry on 30th November 2012. He gave the **keynote address** at the National Conference organized by the Department of Statistics, University of Kerala, at Trivandrum on 10th December 2012. He talked to the first, second and third year undergraduate students on 17th December 2012 for two hours at Assumption College, Changanacherry.

Linia Anie Sunny (JRF-CMS) participated in the National Conference on Algebra and Number Theory (NCANT-2012) held at the Department of Mathematics, Cochin University of Science and Technology on August 16-18, 2012.

Prajitha P. and Princy T. (SRF-CMS) participated and presented papers in the National Seminar on Recent Trend in Statistics and Related Areas (NSRTSRA) in conjunction with the Annual Conference of Kerala Statistical Association (ACKSA) organized by Department of Statistics, University of Calicut, Kerala, from 15-17 March, 2012.

Dr M. A. Pathan gave an **invited talk** at the International Conference on Special Functions and Their Applications and XI Annual Conference of SSFA at S.V. National Institute of Technology, Surat, Gujarat, June 27-29, 2012.

Dr M.A. Pathan gave an **invited talk** at the National Conference on Algebra and Number Theory, Cochin University of Science and Technology, Cochin, Kerala, August 16-18, 2012.

Dr M.A. Pathan gave an **invited talk** at the National Seminar on Current Research and Developments in Mathematics and Computing, Aliah University, Kolkata, West Bengal, October 3-4, 2012.

Dr Ashutosh Shukla of CMS will be presenting the paper "Bayesian inference under asymmetric loss from Pareto distribution with application" at the International Workshop/Conference on Bayesian Theory and Applications (IWCBTA) on January 6-10, 2013 at DST Centre for Interdisciplinary Mathematical Sciences & Department of Statistics, Banaras Hindu University, Varanasi- 221 005, India.

Anitha Thomas receives her Ph.D

Anitha Thomas, a lecturer at Bishop Moore College in Kerala came on leave under Faculty Improvement Program (FIP) to do Ph.D at CMS. As a matter of policy, CMS does not admit part-time scholars in Ph.D program so that quality can be maintained and Ph.D production does not deteriorate into a business. She was asked to register through any other institution of her choice. She was given all facilities and guidance at CMS. The atmosphere at CMS itself brought out her potential and she published four reasonably good papers in international refereed journals within her leave period of two years. She wrote up those results, submitted her Ph.D thesis and received her Ph.D from M.G. University recently. CMS wishes her a bright academic career. Anitha is one of the many who were helped by CMS, though not officially registered through CMS.

New JRFs at CMS

The following individual joined CMS as junior research fellow:

Dhanyamol M.V
in the area of
Graph Theory
&
Combinatorics

Two more are expected to join in the area of Statistics by December 2012. Another two from Ecuador, South America have shown interest to join CMS as junior research fellows. They are likely to join in March-April 2013.

Current Status of Citation Indices of Haubold and Mathai

Author	Citations all	Citations from 2007	h-index all	h-index from 2007	i10-index all	i10-index from 2007
Haubold, H.J.	1238	882	17	15	34	24
Mathai, A.M.	3683	1965	25	21	59	35

Subject-wise ranks of citations

Special Functions	Mainardi (first rank), A.M. Mathai (second rank)
Applied Analysis	Michael Holsa (first rank), A.M. Mathai (second rank)
Statistical Distributions	A.M. Mathai (first rank)
Geometrical Probabilities	A.M. Mathai (first rank)
Multivariate Analysis	A.M. Mathai (first rank)

Note: For Applied Analysis, A.M. Mathai had the first rank until recently.

Distinguished Visitors to CMS

Professor Dr Hans J. Haubold
Professor Haubold of the United Nations/Austria/Germany and a Life Member of CMS visited and gave a series of lectures in May 2012.

Professor Dr Rudolf Gorenflo
Professor Gorenflo of Germany visited CMS for 3 weeks in April-May 2012 and collaborated with the research team at CMS.

Professor Francesco Mainardi
Professor Mainardi of Italy visited CMS for two weeks in April-May 2012 and gave a series of lectures.

Dr K. A. Muralidharan of Gujarat, India, visited CMS on 5-7 November 2012 and continued his research collaboration with the research team at CMS.

Other distinguished visitors who came to CMS to give lectures in the SERC School and for the valedictory session in 2012 are Dr D.V. Pai from IIT Gandhinagar and IIT Bombay, Dr Anulekha Dhara (IIT Gandhinagar), Dr Yageen Thomas (University of Kerala), Dr K.P. Soman (Amrita Institute of Technology, Coimbatore), Dr T. Parthasarathy and Dr G. Ravindran (IIT Madras), Dr Srinivas Rao (Andhra University), Dr P.K. Malhotra (DST), Dr Ashok K. Singh (DST).

International year of Statistics

Perhaps you may know that 2013 is declared as the international year of Statistics. The following message is received from Ron Wasserstein.

To : A.M. Mathai, Centre for Mathematical Sciences, India

Here is the latest news about the International Year of Statistics. Please remember to share this information with your colleagues, and don't forget to send us your news. Drop a note to Ron Wasserstein at ron@amstat.org, and we will promote your International Year of Statistics activities on the statistics2013.org website.

Video Contest Deadline Extended

We are pleased to announce that John Wiley and Sons, Inc., is sponsoring the prizes for the International Year of Statistics video competition. Please visit the competition website http://www.statistics2013.org/videocontest.cfm for details. Please note the new deadline: February 28, 2013.

New Language-Specific Logos Available

The International Year of Statistics (Statistics2013) logo is now available in several languages: Dutch, English, French, Hindi, Italian, Mandarin, Portuguese and Spanish. On each

version the phrases "International Year of Statistics" and "Participating Organization" are presented in the appropriate language. If you need one of these language-specific logos to post to your organization's website, you can download it from http://www.statistics2013.org/logos.cfm

To have a version of the Statistics2013 logo created for your country's language, please email the following information to Jeffrey@amstat.org:

Once your language-specific logo is created it will be posted to the Statistics2013 website and we will send you an email to let you know the logo is available for download.

Statistics 2013 Participation Approaches 1,000

As of October 11, 2012, 955 organizations representing at least 98 countries have signed on as participants for the International Year of Statistics. More than 150 of these organizations joined in the past three weeks! If your organization has not signed on, please do so today by going to http://statistics2013.org and clicking on "Join." Joining creates no obligation, but it does connect you to the worldwide network of organizations and people who will be promoting the profession throughout the International Year of Statistics.

Draft 2013 Poster Available for Review and Comment

Please go to http://www.statistics2013.org/pdfs/STAT2013.pdf to view a draft version of the poster for the International Year of Statistics. Soon we will put it online so you can download and print it. We will also put the elements of the poster online so that you can download them and create your own version of the poster with translations into your own country's languages.

The International Year of Statistics Steering Committee http://www.statistics2013.org/committee.cfm

2012 SERC School
on
Multivariable and matrix variable calculus with applications
2012 theme: Optimization
Sponsored by the
Department of Science and Technology, Government of India
and
conducted by the
Centre for Mathematical Sciences (CMS)
in collaboration with the
Central University of Kerala, Centre for Inter-disciplinary Mathematical Sciences at Banaras Hindu University (CIMS-BHU) and Anna University Coimbatore
16th April to 11th May 2012

TIMETABLE
Saturday 14th, Sunday 15th April 2012: participants arrive and settle

Week 1, Day 1, Monday 16th April 2012

08.30-9.00	Informal talk to the participants by the Course Director Dr A.M. Mathai
09.00-09.30	**Inaugural session**
09.00-09.10	Welcoming participants and introducing prize winners Miss Prajitha P. (DST-SRF at CMS) and Dilip Kumar (DST-SRF at CMS): Dr A.M. Mathai
09.10-09.15	Lighting the ceremonial lamp and inauguration: Dr Alex Thannippara
09.15-09.30	Distribution of prizes and felicitation: Dr Alex Thannippara
09.30-09.45	Coffee break
09.45-12.00	Lecture 1.1: Dr A.M. Mathai [Basic probability and statistics]
12.00-13.00	Problem session 1.1: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)
13.00-14.00	Lunch
14.00-16.00	Lecture 1.2: Dr A.M. Mathai [Basic probability and statistics]
16.00-18.00	Tea + problem 1.2: session (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)

Week 1, Day 2, Tuesday 17th April 2012

08.30-10.30	Lecture 1.3: Dr A.M. Mathai [Statistical distributions]
10.30-13.00	Tea + problem session 1.3:

	(Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)
13.00-14.00	Lunch
14.00-16.00	Lecture 1.4: Dr A.M. Mathai [Statistical distributions]
16.00-18.00	Tea + problem session 1.4: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)

Week 1, Day 3, Wednesday 18th April 2012

08.30-10.30	Lecture 1.5: Dr A.M. Mathai [Multivariate distributions]
10.30-13.00	Tea + problem session 1.5: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)
13.00-14.00	Lunch
14.00-16.00	Lecture 1.6: Dr A.M. Mathai [Multivariate distributions]
16.00-18.00	Tea + problem session 1.6: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)

Week 1, Day 4, Thursday 19th April 2012

08.30-10.30	Lecture 1.7: Dr A.M. Mathai [Matrix-variate distributions]
10.30-13.00	Tea + problem session 1.7: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)
13.00-14.00	Lunch
14.00-16.00	Lecture 1.8: Dr A.M. Mathai [Matrix-variate distributions]
16.00-18.00	Tea + problem session 1.8: (Nicy Sebastian, Seema S. Nair & Dr A.M. Mathai)

Week 1, Day 5, Friday 20th April 2012

0.8.30-10.30	Lecture 1.9: Dr A.M. Mathai [Matrix-variate gamma]
10.30-13.00	Tea + problem session 1.9 : (Nicy Sebastian, Seema S. Nair & Dr. A.M. Mathai)
13.00-14.00	Lunch
14.00-15.30	Lecture 1.10: Dr A.M. Mathai [Matix-variate beta]
15.30-16.30	Tea + **written test 1** (Dr A.M. Mathai)
16.30-18.00	**Quiz 1** (Dr A.M. Mathai)
Saturday, Sunday:	**free, no lectures or problemsessions**

Saturday 21st April 2012:

08.30-21.00	**Free conducted educational tour to Vagamon**

Sunday 22nd April 2012:

10.00-18.00	**Voluntary free TEX training (Dilip Kumar)**

Week 2, Day 1, Monday 23rd April 2012

08.30-10.30	Lecture 2.1: Dr D.V. Pai [Multivariable calculus]
10.30-13.00	Tea + problem session 2.1: (Dr D.V. Pai)
13.00-14.00	Lunch
14.00-16.00	Lecture 2.2: Dr D.V. Pai [Multivariable calculus]
16.00-18.00	Tea + problem session 2.2 (Dr D.V. Pai)

Week 2, Day 2, Tuesday 24th April 2012

08.30-10.30	Lecture 2.3: Dr D.V. Pai [Multivariable calculus]
10.00-13.00	Tea + problem session 2.3: (Dr D.V. Pai)
13.00-14.00	Lunch
14.00-16.00	Lecture 2.4: Dr D.V. Pai [Multivariable calculus]
16.00-18.00	Tea + problem session 2.4: (Dr D.V. Pai)

Week 2, Day 3, Wednesday 25th April 2012

08.30-10.30	Lecture 2.5: Dr D.V. Pai [Introduction to optimization]
10.30-13.00	Tea + problem session 2.5: (Dr D.V. Pai)
13.00-14.00	Lunch
14.00-15.30	Lecture 2.6: Dr D.V. Pai [Introduction to optimization]
15.30-18.00	Tea + **Quiz 2** (Dr D.V. Pai)

Week 2, Day 4, Thursday 26th April 2012

08.30-10.30	Lecture 2.7: Dr Anulekha Dhara [Optimization]
10.30-13.00	Tea + problem session 2.7: (Dr Alulekha Dhara)
13.00-14.00	Lunch
14.00-16.00	Lecture 2.8 : Dr Anulekha Dhara [Optimization]
16.00-18.00	Tea + **Written test 2** (Dr Anulekha Dhara)

Week 2, Day 5, Friday 27th April 2012

08.30-10.30	Lecture 2.9: Dr Yageen Thomas [Order statistics]
10.30-13.00	Tea + problem session 2.9: (Dr Yageen Thomas)
13.00-14.00	Lunch
14.00-16.00	Lecture 2.10: Dr Yageen Thomas [Recent results]
16.00-18.00	Tea+ Problem session 2.10: (Dr Yageen Thomas)

Saturday, Sunday: **free, no lectures or problem sessions**
Saturday 28th April 2012, free voluntary TEX/ Maple training

09.00-18.00hrs   **(Prajitha P. and Princy T.)**

Sunday 29ᵗʰ April 2012

                free voluntary TEX/ Maple training

10.00-18.00hrs   **(Prajitha P. and Princy T.)**

Week 3, Day 1, Monday, 30ᵗʰ April 2012

08.30-10.30	Lecture 3.1: Dr F. Mainardi [Fractional calculus]
10.30-13.00	Tea + problem session (Dr F. Mainardi)
13.00-14.00	Lunch
14.00-16.00	Lecture 3.2: Dr F. Mainardi [Fractional calculus]
15.30-18.00	Tea + problem session (Dr F. Mainardi)

Week 3, Day 2, Tuesday 1ˢᵗ May 2012

08.30-10.30	Lecture 3.3: Dr F. Mainardi [Fractional calculus]
10.30-13.00	Tea + problem session (Dr F. Mainardi)
13.00-14.00	Lunch
14.00-16.00	Lecture 3.4: Dr F. Mainardi [Fractional calculus & Stochastic processes]
16.00-18.00	Tea + problem session (Dr F. Mainardi)

Week 3, Day 3, Wednesday 2ⁿᵈ May 2012

08.30-10.30	Lecture 3.5: Dr F. Mainardi [Fractional calculus & Stochastic processes]
10.30-13.00	Tea + problem session (Dr F. Mainardi)
13.00-14.00	Lunch
14.00-16.00	Lecture 3.6: Dr F. Mainardi [Fractional differential equations]
16.00-18.00	Tea + **Written test 3** (Dr F. Mainardi)

Week 3, Day 4, Thursday 3ʳᵈ May 2012

08.30-10.30	Lecture 3.7: Dr K.P. Soman [L1 norm optimization]
10.30-13.00	Tea + problem session (Dr K.P. Soman)
13.00-14.00	Lunch
14.00-16.00	Lecture 3.8: Dr K.P. Soman [L1 norm optimization]
16.00-18.00	Tea + problem session (Dr K.P. Soman)

Week 3, Day 5, Friday 4ᵗʰ May 2012

08.30-10.30	Lecture 3.9: Dr K.P. Soman [L1 norm optimization]
10.30-13.00	Tea + problem session (Dr K.P. Soman)
13.00-14.00	Lunch
14.00-16.00	Lecture 3.10: Dr K.P. Soman [L1 norm optimization]
16.00-18.00	Tea + **Quiz 3** (Dr K.P. Soman)

Saturday, Sunday: **free, no classes or problem sessions**

Saturday 5ᵗʰ May 2012

09.00-17.00hrs: **(Prajitha P. and Princy T.)**
                     Latex training + examination

Sunday, 6ᵗʰ May 2012

08.30-19.00hrs: **(Saseendran Menon and Sini Devassy): Conducted educational tour**

Week 4, Day 1, Monday 7ᵗʰ May 2012

08.30-10.30	Lecture 4.1: Dr T. Parthasarathy [Game Theory & Optimization]
10.30-13.00	Tea + problem session (Dr G. Ravindran)
13.00-14.00	Lunch
14.00-16.00	Lecture 4.2: Dr T. Parthasarathy [Game Theory & Optimization]
16.00-18.00	Tea + problem session (Dr G. Ravindran)

Week 4, Day 2, Tuesday 8ᵗʰ May 2012

08.30-10.30	Lecture 4.3: Dr T. Parthasarathy [Game Theory & Optimization]
10.30-13.00	Tea + problem session (Dr G. Ravindran)
13.00-14.00	Lunch
14.00-16.00	Lecture 4.4: Dr T. Parthasarathy [Game Theory & Optimization]
16.00-18.00	Tea + Problem session (Dr G. Ravindran)

Week 4, Day 3, Wednesday 9ᵗʰ May 2012

08.30-10.30	Lecture 4.5: Dr Srinivas Rao [Time Series Models]
10.30-13.00	Tea + problem session (Dr Srinivas Rao)
13.00-14.00	Lunch
14.00-16.00	Lecture 4.6: Dr Srinivas Rao [Time Series Models]
16.00-18.00	Tea + Problem session, on computer training (Dr Srinivas Rao)

Week 4, Day 4, Thursday 10ᵗʰ May 2012

08.30-10.30	Lecture 4.7: Dr H.J. Haubold [Astrophysics]
10.30-13.00	Tea + discussion with students' participation (Dilip Kumar, Nicy Sebastian, Seema S. Nair, Dhannya P. Joseph & Dr H.J. Haubold)
13.00-14.00	Lunch
14.00-16.00	Lecture 4.8: Dr H.J. Haubold [Astrophyiscs]

16.00-18.00	Tea + discussion with students' participation (Dilip Kumar, Nicy Sebastian, Seema S. Nair, Dhannya P. Joseph & Dr H.J. Haubold)	12.10-12.20	Inaugural address: Dr Hans J. Haubld
		12.20-12.30	Felicitation of national/international level prize winners at CMS (Dilip Kumar, Seema S. Nair, Prajitha P., Nicy Sebastian, Dhannya P. Joseph): Citations and distribution of citations by Dr Ashok K. Singh

Week 4, Day 5, Friday 11ᵗʰ May 2012

08.30-10.00	Discussions with participants, Dr H.J. Haubold, Dilip Kumar, Seema S. Nair, Nicy Sebastian and Dhannya P. Joseph		
10.00-12.00	**Quiz 4** (Dr H.J. Haubold)	12.30-12.40	Distribution of participation certificates: Dr Ashok K. Singh
12.00-13.00	**Valedictory session and distribution of certificates** Chief guests: Dr Hans J. Haubold (UN), Dr Ashok K. Singh (DST)	12.40-12.45	Distribution of SERC School and TEX prizes: Dr Hans J. Haubold
		12.45-12.55	Responses from participants
		12.55-12.58	Response from the Course Director: Dr A.M. Mathai
12.00-12.05	Welcome: Dr A. M. Mathai		
12.05-12.10	Lighting the ceremonial lamp and inauguration: Dr Hans J. Haubold	12.58-13.00	National Anthem
		13.00-14.00	Lunch
		14.00-18.00	**Departure of participants**

2012 SERC group photo

2012 SERC inauguration

2012 SERC valedictory

2012 SERC lectures

Dr D.V. Pai

Dr Yageen Thomas

Dr F. Mainardi

2012 SERC School - first prize - Mr K. Karuppiah

2012 SERC School - second prize - Miss Linia Anie Sunny

2012 SERC School - third prize - Ms Juvairiyya R.M.

2012 SERC School LaTex - first prize - Mr R. Arun

2012 SERC School LaTex - second prize - Mr K. Karuppiah

2012 SERC School LaTex - third prize - Mr V. Govindaraj

CMS Scholar for Newman College

Sona Jose (DST-SRF at CMS) was loaned to Newman College Thodupuzha, Kerala, India, for five weeks in September-October 2012 to teach M.Sc level and B.Sc final year level courses due to an emergency situation. By this gesture, she acquired teaching experience also.

Undergraduate Mathematics Training Camps

The 14th, 15th and 16th undergraduate Mathematics training camps were conducted in August-September and November 2012. The 17th camp will be conducted from 21st December 2012. This will complete the four proposed camps for 2012. Undergraduate camps are sponsored by the Department of Science and Technology, Government of India (DST). 30 participants are financed by DST, including their travel, accommodation, food and study materials, and the remaining ones by CMS. The camps are open to first, second and third year degree students (B. Sc level) and each camp is of 10 days duration, continuous for 10 days with around 40 hours of lectures and 40 hours of problem-solving sessions, usually conducted during the holiday time for regular college students so that they could come and participate. The lectures are from 08.30 to 10.30 and 14.00 to 16.00 hrs followed by problem solving sessions from 10.30 to 13.00 hrs and 16.00 to 18.00 hrs with short breaks at 10.30 and 16.00 hrs. These courses are not aimed at any degree program in any university in India. The aim is to give them basic knowledge on various subjects, which they may not find clearly explained in any book. In order to motivate the students, examples are taken from real-life situations so that they can connect the concepts to practical situations. The lectures are usually given by Professor A.M. Mathai and there is a huge lineup to get into the program. Even though strenuous to give four hours of lectures daily and continuously for 10 days and sometimes two camps in succession, Dr Mathai does it as a service to the younger generation in India. Each college in Kerala can send up to five students. The program is open to all in India and abroad but due to random changes in examination schedules in the universities in Kerala it is not possible to fix the dates of camps in advance and give sufficient notice which will enable participation from outside Kerala. In each camp the top three students are given prizes in the form of books. All are given participation certificates and course certificates. The course certificates also contain the cumulative grades in all their examinations. On the 3rd, 6th and 10th days there are one hour written tests, the tests are cumulative, and on the 10th day there is an individual viva also. The cumulative grades from all these four tests will appear in their certificates. Those who score 50% or more are considered as having passed the course work. A number of students who had gone through CMS camps had passed national competitive examinations and secured admissions in several national institutes of excellence.

14th UG Camp group photo

15th UG Camp group photo

16th UG Camp group photo

NEWS FROM LIFE MEMBERS

List of recent publications of Professor R.K. Saxena

1. On generalized Hurwitz-Lerch zeta distributions occurring in statistical inference. *Acta Univ. Sapientiae, Mathematica*, **3** (2011), 43-59 (with T.K. Pogany, Ravi Saxena, and Dragana Jankov).

2. Integral representation of generalized Mittag-Leffler functions of fractional calculus. *International Journal of Mathematical Sciences and Applications,* **1** (2011), 49-61 (with J. Ram and M. Bishnoi).

3. Fractional generalization of Schrödinger equation related to Quantum Mechanics. *Revista Technocientifica URU, University Rafael Urdaneta, Facultad de Ingenieria*, **1** (2011), 73-84 (With S.L. Kalla and Ravi Saxena).

4. An extended general Hurwitz- Lerch zeta function as a Mathieu- (a, o) 0 . series. *Applied Mathematics Letters*, **24** (2011), 1473-1476 (with Dragana Jankov and T.K. Pogany).

5. Some Mathieu-type series for the I-function occurring in the Fokker- Planck equation. *Proyecciones Journal of Mathematics*, **30**, (2011), 111-122 (with T.K. Pogany).

* * *

Professor Dr Hans J. Haubold (Life Member, CMS) writes from Vienna, Austria:

UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS (UNPSA 1991-2012):

United Nations Basic Space Science Initiative (UNBSSI 1991-2012).

The UNBSSI is a long-term effort for the development of astronomy and space science through regional and international cooperation in this field on

a worldwide basis, particularly in developing nations. UNBSSI workshops are co-sponsored and co-organized by ESA, JAXA, and NASA.

A series of workshops on BSS were held from 1991 to 2004 (India 1991, Costa Rica and Colombia 1992, Nigeria 1993, Egypt 1994, Sri Lanka 1995, Germany 1996, Honduras 1997, Jordan 1999, France 2000, Mauritius 2001, Argentina 2002, and China 2004; http://neutrino.aquaphoenix.com/un-esa/) and addressed the status of astronomy in Asia and the Pacific, Latin America

and the Caribbean, Africa, and Western Asia. Through the lead of Professor Dr Masatoshi Kitamura (1926-2012) from the National Astronomical Observatory, Japan, astronomical telescope facilities were inaugurated in seven developing nations and planetariums were established in twenty developing nations based on the donation of respective equipments by Japan.

Pursuant to resolutions of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and its Scientific and Technical Subcommittee, since 2005, these workshops focused on the preparations for and the follow-ups to the International Heliophysical Year 2007 (UAE 2005, India 2006, Japan 2007, Bulgaria 2008, South Korea 2009; http://www.unoosa.org/oosa/SAP/bss/ihy2007/index.html). IHY's legacy is the current operation of 16 worldwide instrument arrays with close to 1000 instruments recording data on solar-terrestrial interaction from coronal mass ejections to variations of the total electron content in the ionosphere (http://iswi-secretariat.org/). Instruments are provided to hosting institutions by entities of Armenia, Brazil, France, Israel, Japan, Switzerland, and the United States.

Starting in 2010, the workshops focused on the International Space Weather Initiative (ISWI) as mandated in a three-year-work plan as part of the deliberations of UNCOPUOS. Workshops on ISWI were scheduled for Egypt in 2010 for Western Asia, Nigeria in 2011 for Africa, and Ecuador in 2012 for Latin America and the Caribbean. The latter one was held from 8-12 October 2012 at the Astronomical Observatory of Quito (http://oaq.epn.edu.ec/iswi/index.html). This workshop will review the results of the operation of the above instrument arrays and will discuss ways and means to continue space weather research and education, particularly focusing on programmes as

implemented by the International Center for Space Weather Science and Education at Kyushu University, Fukuoka, Japan (http://www.serc.kyushu-u.ac.jp/index_e.html), which was established through the UNBSSI in 2012. Similar research and education centers were also established in Nigeria (http://www.cbssonline.com/aboutus.html) and India (http://www.cmsintl.org/).

Activities of UNBSSI are also coordinated with the Regional Centres for Space Science and Technology Education, affiliated to the United Nations (http://www.unoosa.org/oosa/en/SAP/centres/index.html) and the International Committee on Global Navigation Satellite Systems (http://www.unoosa.org/oosa/en/SAP/gnss/icg.html).

Further Reading:

United Nations Programme on Space Applications, UN document ST/SPACE/52/Rev1, V.12-55442-September 2012, United Nations Office at Vienna, http://www.unoosa.org/oosa/en/about_PSA.html

W. Wamsteker, R. Albrecht, and H.J. Haubold (Eds.): Developing Basic Space Science World-Wide: A Decade of UN/ESA Workshops, Kluwer Academic Publishers, Dordrecht/Boston/London 2004.

B.J. Thompson, N. Gopalswamy, J.M. Davila, and H.J. Haubold (Eds.): Putting the "I" in IHY: The United Nations Report for the International Heliophysical Year 2007, Studies in Space Policy Volume 3, Springer, Wien/New York 2009.

K. Yumoto (Ed.): Selected Papers of MAGDAS for ISWI/MAGDAS School on Litho-Space Weather, 15-20 August 2011, International Centre for Space Weather Science and Education, Kyushu University, Fukuoka, Japan, 2012, pp. 264.

Lectures at 2012 SERC School

BACK TO THE SOLAR NEUTRINO PROBLEM

H.J. Haubold, A.M. Mathai and R.K. Saxena

Introduction

This Letter to the Editor of the COSPAR Bulletin summarizes briefly a research programme, implemented through UN/ESA/NASA/JAXA workshops since 1991, comprising four elements (i) standard deviation analysis and diffusion entropy analysis of solar neutrino data, (ii) Mathai's entropic pathway model, (iii) fractional reaction and extended thermonuclear functions, and (iv) fractional reaction-diffusion. Boltzmann translated Clausius' second law of thermodynamics "The entropy of the Universe tends to a maximum" into a crucial quantity that links equilibrium and non-equilibrium (time dependent) properties of physical systems and related entropy to probability, $S = k \log W$, which later Einstein called Boltzmanns principle. Based on this principle of physics, Planck found the correct formula for black-body radiation that lead him to the discovery of the elementary quantum of action that initiated the development of quantum theory. Extremizing the Boltzmann entropic functional under appropriate constraints produces the exponential functional form of the distribution for the respective physical quantity. Today a question under intense discussion in statistical mechanics is on how to generalize Boltzmanns entropic functional, if extremized under appropriate constraints, to accommodate power law distribution functions observed so frequently in nature. One of such generalizations is Tsallis statistics that contains Boltzmann statistics as a special case. Tsallis statistics is characterized by q-distributions which seem to occur in many situations of scientific interest and have significant consequences for the understanding of natural phenomena. One of such phenomena concerns the neutrino flux emanating from the gravitationally stabilized solar fusion reactor. Davis established the solar neutrino problem which was resolved by the discovery of neutrino oscillations. A remaining question to date is still the quest for more information hidden in the solar neutrino records of numerous past and currently operating solar neutrino experiments. Greatly stimulated by the question raised long time ago by R.H. Dicke "Is there a chronometer hidden deep in the Sun?", Mathai's research programme on the analysis of the neutrino emission of the gravitationally stabilized solar fusion reactor, focused on non-locality (long-range correlations), non-Markovian effects (memory), non-Gaussian processes (Levy), and non-Fickian diffusion (scaling), possibly evident in the solar neutrino records, taking also into account other results of helio-seismology and helio-neutrinospectroscopy.

1. Solar Neutrino Data

Over the past 40 years radio-chemical and real-time solar neutrino experiments have proven to be sensitive tools to test both astrophysical and elementary particle physics models and principles. Solar neutrino detectors (radio-chemical: Homestake, GALLEX + GNO, SAGE, real-time: Kamiokande + SuperKamiokande, SNO, Borexino) have demonstrated that the Sun is powered by thermonuclear fusion reactions. Two distinct processes, the pp-chain and the sub-dominant CNO-cycle, are producing solar neutrinos with different energy spectra and fluxes. To date only fluxes from the pp-chain have been measured: ^7Be, ^8B, and, indirectly, pp. Experiments with solar neutrinos and reactor anti-neutrinos (KamLAND) have confirmed that solar neutrinos undergo flavor oscillations (Mikheyev-Smirnov-Wolfenstein model). Results from solar neutrino experiments are consistent with the Mikheyev-Smirnov-Wolfenstein Large Mixing Angle (MSW-LMA) model, which predicts a transition from vacuum-dominated to matter-enhanced oscillations, resulting in an energy dependent electron neutrino survival probability. Non-standard neutrino interaction models derived such neutrino survival probability curves that deviate significantly from MSW-LMA, particularly in the 1-4 MeV transition region. The mono-energetic 1.44 MeV pep neutrinos, which belong to the pp-chain and whose Standard Solar Model (SSM) predicted flux has one of the smallest uncertainties due to the solar luminosity constraint, are an ideal probe to test these competing non-standard neutrino interaction models in the future.

2. Standard Deviation Analysis and Diffusion Entropy Analysis

For all radio-chemical and real-time solar neutrino experiments, periodic variation in the detected solar neutrino fluxes have been reported, based mainly on Fourier and wavelet analysis methods (standard deviation analysis). Other attempts to analyse the same data sets, particularly undertaken by the experimental collaborations themselves, have failed to find evidence for such variations of the solar neutrino flux over time. Periodicities in the solar neutrino fluxes, if confirmed, could provide evidence for new solar, nuclear, or neutrino physics beyond the commonly accepted physics of vacuum-dominated and matter-enhanced oscillations of massive neutrinos (MSW model) that is, after 40 years of solar neutrino experiment and theory, considered to be the ultimate solution to the solar neutrino problem. Specifically, subsequent to the analysis made by the SuperKamiokande collaboration, the SNO experiment collaboration has painstakingly searched for evidence of time variability at periods ranging from 10 $years$ down to 10 $minutes$. SNO has found no indications for any time variability of the ^8B flux at any timescale, including in the frequency window in which g-mode oscillations of the solar core might be expected to occur. Despite large efforts

to utilize helio-seismology and helio-neutrinospectroscopy, at present time there is no conclusive evidence in terms of physics for time variability of the solar neutrino fluxes from any solar neutrino experiment. If such a variability over time would be discovered, for example in the Borexino experiment, a mechanism for a chronometer for solar variability could be proposed based on relations between properties of thermonuclear fusion and g-modes. All above findings encouraged the conclusion that Fourier and wavelet analysis, which are based upon the analysis of the variance of the respective time series (standard deviation analysis: SDA), should be complemented by the utilization of diffusion entropy analysis (DEA), which measures the scaling of the probability density function (pdf) of the diffusion process generated by the time series thought of as the physical source of fluctuations. For this analysis, the publicly available data of SuperKamiokande-I and SuperKamiokande-II have been used by the authors of this Letter. Such an analysis does not reveal periodic variations of the solar neutrino fluxes but shows how the pdf scaling exponent departs in the non-Gaussian case from the Hurst exponent. Figure 1 shows Hurst exponents (SDA) and scaling exponents (DEA) for the SuperKamiokande data. SuperKamiokande is sensitive mostly to neutrinos from the ^8B branch of the pp nuclear fusion chain in solar burning. Above approximately 4 MeV the detector can pick-out the scattering of solar neutrinos off atomic electrons which produces Cherenkov light in the detector. The ^8B and rarer hep neutrinos have a spectrum which ends near 20 MeV.

Assuming that the solar neutrino signal is governed by a probability density function with scaling given by the asymptotic time evolution of a pdf of x, obeying the property $p(x,t) = \frac{1}{t^\delta}F(\frac{x}{t^\delta})$, where δ denotes the scaling exponent of the pdf. In the variance methods, scaling is studied by direct evaluation of the time behaviour of the variance of the diffusion process. If the variance scales, one would have $\sigma_x^2(t)t^{2H}$, where H is the Hurst exponent. To evaluate the Shannon entropy of the diffusion process at time t, one defines $S(t)$ as $S(t) = -\int_{-\infty}^{+\infty}dx\,p(x,t)\ln p(x,t)$ and with the previous $p(x,t)$ one has

$$S(t) = A + \delta\ln(t), \quad A = -\int_{-\infty}^{+\infty}dy F(y)\ln F(y)$$

The scaling exponent δ is the shape of the entropy against the logarithmic time. This is shown in Figure 1 for the SuperKamiokande data measured for ^8B and hep. The Hurst exponents (SDA) are $H = 0.66$ and $H = 0.36$ for ^8B and hep, respectively. The pdf scaling exponents (DEA) are $\delta = 0.88$ and $\delta = 0.80$ for ^8B and hep, respectively. Tese values indicate a deviation from Gaussian behavior.
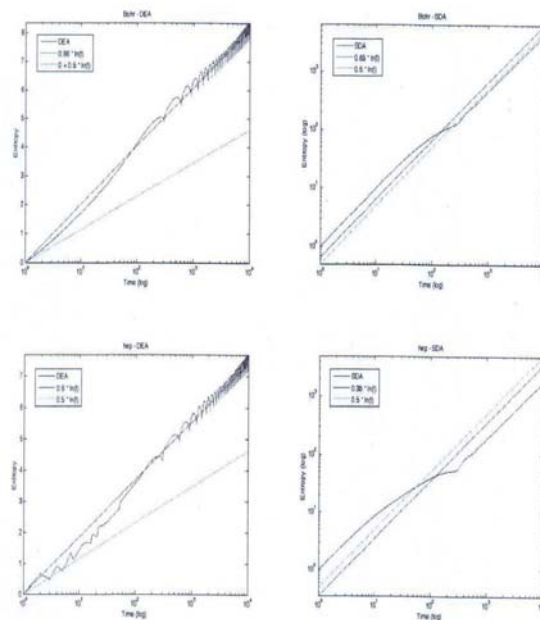

Figure 1: Shows the Standard Deviation Analysis (SDA) and Diffusion Entropy Analysis (DEA) of the solar neutrino data from the Super-Kamiokande-II experiment.

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3. Mathai's Entropic Pathway Model

From a general point of view of fitting experimental data to mathematical functions, a model, which moves from the generalized type-1 beta family to the type-2 beta family to the generalized gamma family to the generalized Mittag-Leffler family and eventually to the Levy distributions, has been developed by Mathai. All these different parametric families of functions are connected through Mathai's pathway parameters. To generalize Shannon's entropy to an entropic pathway, Mathai introduced the generalized entropy of order α that is also associated with Shannon (Boltzmann-Gibbs), Renyi, Tsallis, and Harvrda-Charvat entropies. Applying the maximum entropy principle with normalization and energy constraints to Mathai's entropic functional, the corresponding parametric families of distributions of generalized type-1 beta, type-2 beta, generalized gamma, generalized Mittag-Leffler, and Levy are obtained in the following form

$$M_2(f) = \frac{\int_{-\infty}^{+\infty} dx[f(x)]^{2-\alpha} - 1}{\alpha - 1} \quad \alpha \neq 1, \alpha < 2,$$

$$f(x) = c_1[1 - \beta(1-\alpha)x^\delta]^{1/(1-\alpha)}$$

$\alpha < 1$ for type-1 beta, $\alpha > 1$ for type-2 beta, $\alpha \to 1$ for gamma, and $\delta = 1$ for Tsallis.

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In principle, any entropic functional in Mathai's pathway can be tested through the above Diffusion Entropy Analysis against experimental data.

4. Fractional Reaction and Extended Thermonuclear Functions

Solar nuclear reactions occur preferably between nuclei in the high-energy tail of the energy distribution and are sensitive to deviations from the standard equilibrium thermal energy distribution (Maxwell-Boltzmann distribution).

Reaction and relaxation processes in plasmas are governed by ordinary differential equations of the type $\frac{dN(t)}{dt} = c\, N(t)$ for exponential behavior. The coefficient c itself can be considered to be a statistical quantity subject to accommodating a distribution of its own. To address non-exponential properties of a reaction or relaxation process, the first-order time derivative can be replaced by a derivative of fractional order in the following way $N(t) = N_0 - c^\nu\, {}_0D_t^{-\nu}\, N(t)$, where ${}_0D_t^{-\nu}$ denotes a Riemann-Liouville fractional integral operator, and the solution can be represented in terms of Mittag-Leffler functions E_ν by $N(t) = N_0 E_\nu(-c^\nu t^\nu)$. Considering c to be a random variable itself, $N(t)$ is to be taken as $N(t \mid c)$ and can be written as $N(t \mid c) = N_0 t^{\mu-1} E_{\nu,\mu}^{\gamma+1}(-c^\nu t^\nu)$, $\mu > 0, \gamma > 0, \nu > 0$, which represents a generalized Mittag-Leffler function. If c is a random variable having a gamma type density $g(c) = $

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$\frac{\omega^\mu}{\Gamma(\mu)}\, c^{\mu-1} e^{-\omega c}$ $\omega > 0, 0 < c < \infty, \mu > 0$, with μ/ω is the mean value of c. The integration of $N(t \mid c)$ over $g(c)$ gives the unconditional density, as

$$N(t) = \frac{N_0}{\Gamma(\mu)} t^{\mu-1}[1 + b(\alpha-1)t^\nu]^{-1/(\alpha-1)}$$

with $\gamma + 1 = 1/(\alpha-1), \alpha > 1 \to \gamma = (\alpha-2)/(\alpha-1)$ and $\omega^{-\nu} = b(\alpha-1), b > 0$, which corresponds to Tsallis statistics for $\mu = 1, \nu = 1, b = 1$, and $\alpha = q > 1$, physically meaning that the common exponential behavior is replaced by a power-law behavior, including Levy statistics.

5. Fractional Reaction-Diffusion

In recent time, an analytic approach to non-conventional reaction and diffusive transport by taking into account fractional space and time derivatives has been developed. The probability density function for the above SuperKamiokande data is non-Gaussian and exhibits stretched exponential tails as can be shown by using $N(t)$. In order to model these experimental findings, a transport model for the pdf, based on fractional diffusion that includes both non-local and non-Gaussian features was proposed. Reaction and diffusion in the solar thermonuclear fusion plasma are non-linear phenomena that may be subject to non-Fickian transport (non-locality), non-Markovian effects (memory), and non-Gaussian scaling (Levy). Fractional diffusion operators are integro-differential operators that incorporate the former three phenomena in a natural way and may be, in this regard, constitute spatio-temporal elements of fundamental theory of physics. This issue is currently under hot debate. Continues time random walk (CTRW) balance equations (master equations) with temporal memory, generation/destruction terms, and spatio transport/relaxation elements yield non-linear fractional reaction-diffusion equations whose solutions are a

focus of current research and only very special cases have been dealt with so far. Equally difficult to reveal is the interplay between fractional reaction and fractional diffusion in such non-linear equations. This difficulty is amplified by the fact that various definitions of fractional operators exist (Riemann-Liouville, Caputo, Weyl, Gruenwald-Letnikov, Riesz-Feller, ...). At this point of time there is no general understanding under which specific mathematical and physical conditions a probabilistic interpretation can be given to unified fractional reaction-diffusion equations. And this difficulty is even further amplified by the observation that the replacement of integer order with fractional order time derivatives changes the fundamental concept of time and violates the principle that time evolution (change) is time translation and that fractional order space derivatives are bridging the respective differential equation between the case of diffusion equation and wave equation.

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6. Conclusion

The use of solar neutrino detection records, by analyzing the average neutrino flux of the experiments, have lead to the discovery of new elementary particle physics, the MSW effect, and thus resolved the solar neutrino problem. This confirmed that the Standard Solar Model is implementing physical principles correctly. The quest for the variation of the solar neutrino flux over time remains an open question. Additionally, the utilization of standard deviation analysis (scaling of the variance) and diffusion entropy analysis (scaling of the pdf) lead to the discovery of an unknown phenomenon related to non-equilibrium signature in the gravitationally stabilized solar fusion reactor as explored by looking at Mathai's pathway model with fractional reaction and diffusion, as reported in this Letter.

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Kerala Science Congress

Centre for Mathematical Sciences (CMS) is requested to organize a one-day session on mathematical science at the Kerala Science Congress to be held at Technopark, Thiruvananthapuram, from 29th January to 2nd February 2013.

NEWS FROM OTHER CAMPUSES

1a. Department of Physics, Central University of Kerala, Kasaragode, Kerala, India (CUK)

Workshops/ Seminars

1. The Physics Department of the Central University of Kerala has organized a one -day workshop on Computer Interfaced Physics Experiments, a hands-on training using expEYES- a system developed by the Inter-University Accelerator Centre (IUAC) as a part of the PHOENIX (Physics with home-made equipments and innovative experiments) project on 15th December 2011.

2. *International Workshop on Nano-materials, Synthesis, Characterization and Modeling, September 24-27, 2012*. The workshop had detailed video presentations on preparation and characterization of nano-materials and devices. The resource persons included Dr Venkata Saravanan from Portugal and Dr Renjith S. Pillai from Spain.

Publications

1. Jolly Andrews and Vincent Mathew (2012): Field dependent characteristics of super conducting microstrip resonators in mixed state, *Supercond. Sci. Tech.*, **25**, 025004.

2. Gishamol Mathew, Bhagyaraj C, Anju Babu, and Vincent Mathew (2012): Effect of gyrotropic substrates on the surface plasmon polaritons guided by metal films of finite width. *Journal of Lightwave Technology*, **30(2)**, 273-278.

3. Gishamol mathew and Vincent Mathew (2012): Tunable surface plasmon polaritons in metal stripe waveguides with magnetised semiconductor substrates in voigt geometry. *Semiconductor Science and Technology,* **27(5),** 055010.

4. Jesly Jacob, Ajith R, P. Arun, and Vincent Mathew, Surface plasmon near field effects in silver nano cylinders arranged in triangular geometry. *Journal of Computational and Theoretical Nanoscience* (Accepted).

5. E. Prasad, et al. (2012): Fission fragment angular distribution measurement for $^{16}O + ^{194}Pt$ reactions at energies near the Coulomb barrier. *Nucl. Phys A*, **882**, 62-70.

6. S. Nath, et al. (2011): Angular momentum distribution for the formation of evaporation residues in fusion of ^{19}F with ^{184}W near the coulomb barrier. *Nucl. Phys. A*, **850**, 22-33.

7. Sunil Kalkal, et al. (2011): Multi-nucleon transfer reactions for $^{28}Si + ^{90,94}Zr$ systems in sub and near barrier regions. *Physical Review Rev. C*, **83**, 054607 -054614.

8. S.C. Sahoo, et al. (2012): Thickness dependent anomalous magnetic behavior in cobalt ferrite thin film. *Appl. Phys. A*, **106**, 931-935.

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1b. Department of Mathematics, Central University of Kerala, Kasaragode, Kerala, India (CUK)

Faculty news

Dr K.A. Germina is appointed as Associate Professor and Head of the Department of Mathematics, Central University of Kerala, Kasaragode, Kerala, India, on deputation.

Dr K.A. Germina

Dr Germina gave a lecture in the **"Lecture Series in Graph Theory"** organized by the Department of Applied Mathematics with Oceanology and Computer Programming, Vidyasagar University, Midnapore-721102 West Bengal during 23-25, March 2012.

Dr Germina gave an **invited talk** at the National workshop on Application of Graph Theory to Engineering organized by the Department of Mathematics, NIT Durgapur during 26-28, March 2012.

Dr Germina under the capacity as the *Corresponding Guest Editor* attended the meeting of Guest Editors, of the Special Issue of the Journal of Combinatorics, Information & System Sciences (JCISS) containing the best part of the technical proceedings of the DST-sponsored International Workshop on Set-valuations, Signed Graphs, Geometry and Applications (Venue: Mary Matha Arts & Science College, Mananthavady; Dates: 2-6 September 2011), held in two intensive Review Sessions during the periods spanning 1-4 April 2012 and 7-30 April 2012 at the Srinivasa Ramanujan Center for Intensification of Interaction in Interdisciplinary Discrete Mathematical Sciences (SRC-IIIDMS), University of Mysore, to finalize the contents of the Special Issue. During this time, she and her research group had detailed discussions on the research topic on signed graphs and set-valuations of Graphs with B. D Acharya, Thomas Zaslavsky, E. Sampathkumar and S. B. Rao during April 2012.

Dr Arjun K Rathie
(Visiting faculty, Central University of Kerala, Kasaragode, Kerala, India)

* Dr Rathie visited Sultan Qaboos University, Muscat, Oman, for participation in a Omanion research project during October 6-12, 2012.

* Dr Rathie delivered a one-hour **invited talk** titled "Kummer's second theorem, its generalization with applications" to the members of the department of Mathematics & Statistics, Sultan Qaboos University, Muscat, Oman on October 9, 2012.

* Dr Rathie delivered one hour invited talk in the *National Seminar on Ramanujan* held at the Government College, Kasaragod on November 1, 2012.

Ph. D degrees awarded under the supervision of Dr Germina.

The following have submitted their Ph. D theses at Kannur University and are awaiting for the theses defence

Mr Shahul Hammed has submitted Ph. D thesis to Kannur University (Supervisor: Dr K.A. Germina).

Ms Viji Paul has submitted Ph. D thesis to Kannur University (Supervisor: Dr K.A. Germina).

Research Publications

Papers published recently by the faculty and students of the Department of Mathematics, Central University of Kerala

1. Viji Paul and K.A. Germina (2012)**:** On edge colouring of hypergraphs and Erdos-Faber-Lovasz conjecture. *Discrete Mathematics, Algorithms and Applications (DMAA),* **4(1)**, pp.12500 (5 pages).

2. Viji Paul and K. A. Germina (2012): On structural properties of 3-uniform linear hypergraph set indexers of a graph. *Advances in Theoretical and Applied Mathematics*, **7(91),** 95-104.

3. Y.S. Kim and A.K.Rathie (2012): Two results for terminating $_3F_2(2)$ series. *Bull. Korean math. Soc.,* 49(3), 621-633.

4. Y.S. Kim, A.K. Rathie and R.B. Paris (2012): On a new class of summation formulae involving Laguerre polynomials. *Integral Transforms & Special Functions*, **23(4)**, 435-444 (2012).

5. M.A. Rakha, A.K. Rathie, Purnima Chopra and R.B. Paris (2012): On New hypergeometric identities arising from Gauss's second summation theorem due to Exton. *Miskolc Math. Notes*, **13(1),** 87-89

6. T. Pogany, A.K. Rathie and S. Ali (2012): Integral and computational representations of summation which extends a Ramanujan's sum. *Matematicki Vesnik*, **64(3)**, 621-633.

7. Y.S. Kim and A.K. Rathie (2012): A new proof of Saalschutz summation theorem for the series 3F2(1) and its contiguous results with applications. *Communications of Korean Math. Soc.*, **27(1)**, 129-135.

8. Y.S. Kim, A.K. Rathie and U. Pandey (2012) : New summation formulas for the generalized hypergeometric functions of higher order. *Honam Math. J.*, **34(3)**, 467-472.

Workshops and Conferences at CUK

Department of Mathematics CUK organized a workshop on "THE UNIT DISC**"** by Dr K. Parthasarathy, former Director, Ramanujan Institute for Advanced Study in Mathematics, Chennai on November 2, 2012.

Final year M. Sc. students of Department of Mathematics, CUK, attended and six of them (K. Deepa, V.N. Pranisha, P.V. Priyanka, P.E. Shameema, K. Shashidhara, K.S. Thanseera) presented papers on the works of Ramanujan in the Swadesi Science Congress organized by CPCRI Kasaragode during 6-8 November 2012.

Forthcoming Events

Department of Mathematics, Central University of Kerala, plans to conduct a series of workshops for the benefit of M. Sc/Ph. D students and faculty.

(a)   Workshop on Applied Analysis, 20 - 22 December 2012.

(b)   Workshop on Discrete Mathematics (Graph Theory), 10-12 January 2013.

(c)   Workshop on Linear Algebra, 4-6 February 2013.

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Recent Publications

1. S. Minimol and P. Yageen Thomas (2012): On some properties of Makeham distribution using generalized record values and its characterization. *Brazelian Journal of Probability and Statistics* (available online).

2. G Lesitha and P. Yageen Thomas (2012): Estimation of the scale parameter of log-logistic distribution. *Metrika* (available online).

Recent Publications whose complete details not submitted to CMS earlier

3. C. Satheesh Kumar (2011): Some properties of Quinkert distributions, in *Statistical Methods in Interdisciplinary Studies,* 181-188.

4. C. Satheesh Kumar and D.S. Shibu (2011): Some finite mixtures of intervened Poisson distributions, in *Statistical Methods in Interdisciplinary Studies,* 93-103.

5. C. Satheesh Kumar and B. Unnikrishnan Nair (2011): On generalized hyper-Poisson distribution, in *Statistical Methods in Interdisciplinary Studies,* 71-78.

Conferences attended and papers presented by the Faculty members

Dr P. Yageen Thomas gave an **invited talk** on "Non parametric Inference", UGC sponsored 'Applications of Statistics in Bio- Medical Research' from 24th to 25th of January, 2012 at the Department of Statistics, NSS College for Women, Trivandrum. He also gave an **invited talk** on "Is a Good Researcher in Mathematical Science a Nakkeran?", at the National Symposium on Statistics and its Applications for Young Researchers-(NSSAYR-2012), held during 24th to 26th February, 2012 at the Department of Statistics, University of Madras, Chepauk Campus, Chennai – 600 005. He gave an **invited talk** on "How to Emerge as a Good Researcher in Mathematical Sciences?", at the National Seminar On Recent Trends In Statistics and Related Areas [NSRTSRA-12] in conjunction with the "Annual Conference of Kerala Statistical Association [ACKSA]" from 15th to 17th March 2012 at the Department of Statistics, University of Calicut and gave an **invited talk** on "Applications of certain properties of concomitants of order statistics in modeling bivariate distributions", at the UGC sponsored National Conference on Stochastic Modeling and Its Applications, held from 26th to 28th September 2012 at the Department of Statistics Manonmaniam Sundaranar University, Tirunelveli-627012. Also, he visited the Department of Statistics, University of Delhi and gave a talk on "Applications of certain properties of concomitants of order statistics in characterizing bivariate distributions"

Dr C. Satheesh Kumar delivered a **Invited talk** on "Recent trends in Statistics" as the **Chief Guest** while inaugurating the Mathematics Association of the HHMSPB at N.S.S. College for Women, Trivandrum on 23rd January 2012. Also, the following joint papers were presented in the National Seminar on "Recent Trends in Statistics and Related Areas" held at University of Calicut during 15-17 March, 2012: (i) *On intervened generalized Hermite distribution and its properties* (co-author: Shibu, D.S.), (ii) *An alternative version of hyper-Poisson distribution and its bivariate version* (co-author: Nair, B.U.), (iii) *A new class of two-piece skew normal distribution* (co-author: Anusree, M.R.), (iv) *On an extended intervened geometric distribution and its applications* (co-author: Kumari, S.S.) and (v) *On bivariate zero inflated logarithmic series distribution* (co-author: Riyaz, A.).

Other Activities

1. This department organized several activities with students participation on 29-06-2012 in connection with the Statistics Day-2012 celebrations.

2. Dr P. Yageen Thomas is continuing as the Chief Editor of the Journal of the Kerala Statistical Association and the Department of Statistics functioning as the Editorial Office of the Journal.

3. Dr P. Yageen Thomas is rendering services to Government of Kerala in the capacity as Member in the Prices Board, Government of Kerala.

4. Dr P. Yageen Thomas offered editorial services (as a referee) to several national and international journals in Statistics.

5. Dr C. Satheesh Kumar has been nominated by Kerala Public Service Commission (KPSC), Government of Kerala in the capacity as a member in the

"Standardization Committee of Statisticians" in connection with the Standardization of the difficulty level of three regional examinations, conducted by KPSC, 2012.

6.	Dr C. Satheesh Kumar offered editorial services (as a referee) to an international journal in Statistics: "Communications in Statistics-Theory and Methods" and "Journal of Probability and Statistical Sciences" (Nova Publishers) published from Taiwan.

Other noteworthy events

1.	Online publication *VERTICAL NEWS* made a report titled "Recent Findings in Statistics Described by Researchers from University of Kerala" about the advancement made in the area of Statistics by the publication of the paper by Dr C. Satheesh Kumar and M.R. Anusree of this Department, which appeared in the journal "Statistics and Probability Letters" [Vol. 81, Page: 1813-1821, 2011].

2.	Dr E.I. Abdul Sathar won Professor R. N. Pillai Best Paper Award-2012 of the Alumni Association of the Department of Statistics University of Kerala (AADSUK) from among young alumni members of the Department of Statistics, University of Kerala.

3.	Ms Minimol, S., JRF of this department has won Professor Jacob Sundara Raja Best Paper Award-2012 of the Alumni Association of the Department of Statistics, University of Kerala (AADSUK) from among young registered research scholars of the Department of Statistics, University of Kerala.

4.	Ms Anusree, M.R, JRF of this Department won Professor R.N. Pillai Young Statistician Award-2012 of the Kerala Statistical Association for her paper "A new family of skew-normal distribution" presented in the three day national conference on "Recent Trends in Statistics and Related Areas" held during 15-17 March 2012 at the Department of Statistics, Calicut University.

5.	Ms Resmi, P., research scholar of this Department was selected for Indian Statistical Service (ISS).

AN APPEAL TO WELL-WISHERS

Background history of CMS: The Centre for Mathematical Sciences (CMS) was founded by Professor Aleyamma George, a researcher in the area of population studies, in Trivandrum, Kerala, India in 1977. CMS was registered as a non-profit scientific research and training centre under Charitable Societies Act. Professor George used all her cash savings plus loans against her life insurance, gratuities etc and equipped the institute, and CMS started functioning in a rented building in Vazhuthacad, Trivandrum, Kerala, India. A group of scientists joined her team as voluntary helpers. Her previous personal assistant at the University of Kerala joined her team as voluntary Office Manager. From 1977 to 1984 CMS functioned as demography and applied statistics research centre. Several projects, including a huge Ford Foundation Population Survey were executed under her leadership. She passed away at the end of 1984.

Dr A.M. Mathai's arrival to CMS: The governing body of CMS requested Professor A.M. Mathai (Professor of Mathematics and Statistics at McGill University, the leading university in Canada) to take over the Directorship of CMS and build it into an international centre of excellence. Thus, starting from January 1985, Dr Mathai started as the Honorary Director of CMS. When Dr Mathai took over as Director, CMS had a cash debt of Rs 60,000, furniture on credit, there were 35 project staff who were not paid for six months and there was no money in the project accounts. Dr Mathai approached various State and central governmental agencies and brought in a lot of research projects to CMS. He came to CMS on his own expense from Canada and spent nearly six months every year at CMS in Kerala, on his own expense, in running research projects at CMS in all different areas. Dr Mathai's attempts with successive UDF and LDF State Governments, to persuade them to give support to CMS in the form of basic buildings and grounds, were a failure. But a small grant of initially five lakhs rupees and later reduced to 3 lakhs came from the State government which enabled CMS to pay rent, utilities, mailing etc. Apparently, (narrated by Professor Aleyamma George), Professor George Sudarsan from USA came first to CMS to build it up into an international centre of excellence. After talking to State bureaucrats and politicians, he found that nothing was going to work out in Kerala and hence he went to Madras and built up the Institute of Mathematical Sciences to a top level research institute with multi-crore rupees worth of annual budget provided by the Central Government, but the initial basic buildings and ground came from the State Government.

Shifting CMS from the State capital: By 2000, Dr Mathai had saved up to 11 lakhs rupees at CMS, after paying back all debts and back wages of all project workers. The savings came mainly from the donations by Dr Mathai of his honoraria in various projects and donations of honoraria of many of the resource persons who came to CMS for various programs. But in 2000, the grant from the State government stopped and by 2002 most of the savings of CMS also dried up. Then it was decided to move CMS into a private academic institution that would make available a building rent-free to CMS.

Establishing CMS in a building belonging to St Thomas College Palai: Several offers came and the offer from St Thomas College Palai (Kerala, India) was accepted because this college was also the alma mater of Dr Mathai. By 2002, CMS had built up the best library in mathematical sciences in Kerala by bringing books and journals from Canada, mainly donated by colleagues and friends of Dr Mathai, and by several academic institutions in Canada. Due to logistics of transportation, several offers of books and journals from USA could not be entertained.

From 2002 to the end of 2006, CMS functioned with a few activities, the main one was the continuation of all-India research orientation program called SERC (Science and Engineering Research Council of the Department of Science and Technology, Government of India (DST)) Schools. (Two such Schools were conducted by CMS at Trivandrum, one in 1995 and one in 2000). After seeing the quality of programs conducted by CMS, including the SERC Schools, DST said that if Dr Mathai submitted a development project then it could be given serious consideration by DST.

DST support to CMS and CMS becoming a DST Centre for Mathematical Sciences: A development project was submitted with Dr Mathai as the Principal Investigator (PI) in 2005 and the project was approved by the end of 2006 and large-scale funds came from DST. All activities started by the beginning of 2007, research students and faculty were recruited, and DST had also given a 4-color printing unit (basic unit only) on experimental basis to CMS as per the request of Dr Mathai. Within a year, CMS produced international quality publications by using the basic printing unit. Then DST gave all additional equipments and a full-fledged printing press was established at CMS.

Achievements of CMS scholars: By 2011, CMS scholars (Ph. D students, started with 4 and went up to 17) had won 12 national/international level awards for the best paper presentation, best published paper from India, Young Scientist Award etc by competing with all leading research institutions and universities in India. By 2011, CMS scholars and faculty had published 130 research papers in refereed international journals, more than 50% of those in leading journals in the respective areas, two papers were in the list of best published paper from India, one was in the list of most downloaded papers in 2010 in the Journal of Mathematical Physics (American Institute of Physics publication). Papers from CMS appeared in the research journals: *Linear Algebra and Its Applications, IEEE Transactions on Reliability, Integral Transforms and Special Functions, Fractional Calculus and Applied Analysis, Applied Mathematics and Computations, Journal of Computational and Applied Mathematics, Journal of Mathematical Physics, Astrophysics and Space Science, Physica A, Astroparticle Physics, Sankhya Series B, Statistics, Statistical Papers, Communications in Statistics* etc. During this period, CMS produced 6 research level books and 8 undergraduate-graduate level books (called Modules or self-study materials). Out of the research level books, two were taken as such and published by Springer, New York, one in 2008 [A.M. Mathai and Hans J. Haubold, "*Special Functions for Applied Scientists*"] and one in 2010 [A.M. Mathai, R.K. Saxena and H.J. Haubold, "*The H-function: Theory and Applications*"]. A large number of leading researchers from around the world visited CMS from 2007 to 2012 period, among them A.A. Kilbas from Belarus, F. Mainardi from Italy, R. Gorenflo from Germany, H.J. Haubold from Austria, with very high/highest citation indices in their respective areas.

From 1977 onwards, CMS had been operating from buildings belonging to well-wishers because CMS did not have its own buildings and grounds. Since the phenomenal growth of CMS during the past five years also brought in jealousy, CMS was forced out from the last building after we had invested over Rs 25 lakhs in the construction of additional floor and approach road there.

The momentum that is gained in research and related activities should not be lost. We should build it up for the future generations. CMS will not have a future by operating from buildings belonging to others, it must have its own buildings for a proper growth. All people around the world

will be benefited by having a strong research centre covering all aspects of mathematical sciences, especially the future generations of Keralites. During the past five years it is illustrated that such a strong research group is possible. Those Keralites abroad may kindly pass on this information to friends and colleagues and encourage them to donate to the building funds. If a donor gives funds for one full complex such as the main building or guest house or men's or women's hostels then the governing body of CMS has decided to record the name with honor and if feasible name such a building after the donor. Cheques and bank drafts (preferably cashable in any city in Kerala, India) and made favorable to Director, Centre for Mathematical Sciences or Executive Trustee, Mathematical and Statistical Sciences Trust and may be sent to the Director, Centre for Mathematical Sciences [Arunapuram P.O., Pala, Kerala-686574, India] or may be deposited directly to account in the name of the Director, CMS, account number 0453053000007306 (IFSC Code SIBL0000453), South Indian Bank, Arunapuram P.O., Pala, Kerala-686574, India. Email: br0453@sib.co.in Phone 91+4822-212545 [If it is direct account to account transfer then please inform by e-mail to directorcms458@gmail.com with copy to cmspala@gmail.com so that proper receipt and acknowledgement can be sent right away. The Trust is a charitable Trust and CMS is a Charitable Society and hence the donations will be tax-exempt. **Please do it today itself.**

Summary of the achievements of CMS during 2007-2011

Number of National/International Awards won by CMS scholars = 12

Number of research papers in refereed international research journals =130

Number of research level books =5 [2 of these are published by Springer, New York]

Number of Modules (self-study books at undergraduate-graduate level) =8

Number of Ph.D students trained = 17 (one received Ph.D, 3 submitted Ph.D theses at Banaras Hindu University (BHU) and will receive Ph.D's within the next few months, 3 ready to submit their Ph.D theses at Anna University, Chennai. CMS is a recognized research institute of BHU, Anna University and MG University]

Number of research level students trained through SERC Schools > 150

Number of undergraduate students trained through UG camps > 700

Number of paper presentations abroad by CMS research scholars = 8

Number of paper presentations inside India by CMS scholars > 50

Number of invited and keynote addresses by the faculty of CMS, including a lead keynote address at a United Nations' Workshop >50

Number of conferences sponsored or co-sponsored by CMS =5

Dr A.M. Mathai was honored by several institutions and national societies in India and thrice by the United Nations, once in Tokyo, Japan, once in Daejon, Korea and once in Quito, Ecuador and he gave keynote addresses also.

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Director

CMS