

## **Brief History of the Shakti P. Duggal Award Bartol Research Institute**

After Shakti Duggal's death in 1982, his friends established a fund with its income to provide an award in Shakti's honor. In view of Shakti's long association with cosmic ray physics and his many contributions to the field during his career, the award is:

To recognize an outstanding young scientist for contributions in any branch of cosmic ray physics.

The first Shakti P. Duggal Award was presented at the 19<sup>th</sup> International Cosmic Ray Conference at La Jolla in 1985. Awards have been made at two-year intervals at each of the subsequent cosmic ray conferences.

The winners of the Duggal Award have all achieved recognition and prominence in their careers, as indicated by the list of their current positions:

Raymond J. Protheroe, 1985.  
Senior Lecturer, University of Adelaide, Australia.

Luke O'Conner Drury, 1987.  
Senior Professor in the School of Cosmic Ray Physics,  
Dublin Institute for Advanced Study;  
Member of the Royal Irish Academy.

Jeremy Lloyd-Evans, 1990.  
Senior Lecturer, Department of Physics and Astronomy,  
University of Leeds, England.

Todd Haines, 1991.  
J. Robert Oppenheimer Fellow, Physics Division  
Los Alamos National Laboratory.

Masahiro Teshima, 1993.  
Associate Professor, Institute for Cosmic Ray Research, University of Tokyo  
Director of the Max Planck Institute of Physics, Munich

Ocker C. DeJager, 1995.  
Professor, Potchefstroom University, South Africa.

James Buckley, 1997.  
Washington University, St. Louis.

Martin Pohl, 1999.  
Ruhr Universitat, Bochum, Germany.  
Presently Professor at Potsdam University and DESY-Zeuthen

Teresa Montaruli, 2001.  
Sezione INFN, Bari, Italy.  
Presently Professor at the University of Geneva, Switzerland

Pasquale Blasi, 2003.  
National Institute for Astrophysics, Firenze, Italy.

Jim Hinton, 2005.  
Max-Planck-Institut für Kernphysik, Heidelberg, Germany.  
Now Professor at Leicester University, UK

Diego F. Torres, 2007.  
Universitat Autònoma de Barcelona, Bellaterra, Spain.

Stefan Funk, 2009  
Friedrich-Alexander-Universität Erlangen-Nürnberg

Lukasz Stawarz, 2011  
Institute of Space and Astronautical Science, JAXA, Japan

Rolf Bühler, 2013  
DESY-Zeuthen

Starting in 1991, the award winners have been invited to visit Bartol Research Institute of the University of Delaware to present a colloquium and discuss their work.

Nominations are solicited by announcements in the first bulletins of the international cosmic ray conferences, which are issued about one year before the meeting and which receive a wide distribution. Nominations and letters of recommendation with supporting material are received at Bartol and distributed to an international selection committee. Each member of the selection committee returns written evaluations and a rank-ordered listing. In case of ambiguity in the outcome, a second round of consultation among the committee is invoked.

The Duggal Award has achieved the status of the premier award in the field of cosmic ray physics. The chairman of the Commission on Cosmic Ray Physics of the International Union of Pure and Applied Physics is ex officio member of the selection committee, and the other members are chosen to provide an international committee of leaders in the field that always includes one senior member of Bartol. Members of the 2013 Selection Committee are listed below.

**Selection Committee for the Shakti Duggal Award**

presented at the 33<sup>rd</sup> International Cosmic Ray Conference, Rio de Janeiro, July 3, 2013

Prof. Johannes Knapp (DESY-Zeuthen, Germany, and Chair of IUPAP C4)

Prof. Francis Halzen (University of Wisconsin, USA)

Prof. Jim Hinton (University of Leicester, UK)

Prof. J.R. Jokipii (University of Arizona, USA)

Prof. Vladimir Ptuskin (Institute of Terrestrial Magnetism, Russian Academy of Sciences)

Prof. K-H. Kampert, (University of Wuppertal, Germany)

Prof. Thomas K. Gaisser (Bartol Research Institute, University of Delaware USA)

The best way to get the flavor of the Duggal Award is to examine the record of the presentations which are recorded in the post-conference volumes of the international cosmic ray conferences. The initial presentation is attached to this report.

Thomas K. Gaisser, Newark, Delaware  
Martin A. Pomerantz, San Rafael, California 6/29/07  
(updated by TKG, February, 2015)

INTRODUCTION: Shakti P. Duggal Award Presentation, 1985

When in 1959, Vikram Sarabhai wrote asking whether a post-doctoral appointment at Bartol might be available for his fine young student, he received an affirmative response by return mail. Shakti P. Duggal took up his appointment as a Bartol Fellow the following year, and for the next 22 years, he continued to make important contributions to cosmic ray physics in the field which at this International Cosmic Ray Conference is designated solar-heliospheric – SH.

He had become a well respected member of our community when his brilliant career was cut short at its peak by his untimely death in 1982, at the age of fifty. He had been an active participant in, and contributor to, then of these Conferences, commencing with the 8<sup>th</sup> ICRC in Jaipur in 1963, and ending with the 17<sup>th</sup> ICRC in Paris in 1981. The outpouring of his colleagues from around the world upon learning of his premature passing testifies to the high regard in which he was held, and the genuine affection of all who were fortunate enough to know him.

As a fitting memorial, Shakti Duggal's colleagues and friends established an international award for outstanding work by a young scientist in the field of cosmic ray physics. The recipient of the First Biennial Award has been selected by a committee consisting of M. Casse, A.E. Chudakov, P.H. Fowler, M.A. Pomerantz, J.A. Simpson, and A.W. Wolfendale. I take this opportunity to express deep appreciation to my colleagues on this committee for carrying out the exceedingly difficult task of making a selection among the many outstanding young people who have already attained prominence in our discipline.

With great pleasure, I call upon Professor John R. Prescott to introduce Raymond J. Protheroe as the first recipient of the Shakti P. Duggal Award.

Martin A. Pomerantz  
Bartol Research Foundation  
Of the Franklin Institute  
University of Delaware