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People Profile: Professor Lali Chatterjee

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Professor Lali Chatterjee, Ph.D., FInstP*

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Publications of interest to ATG readers:

Books: Lali Chatterjee, *Muonic Rhapsody & Other Encounters*, Roli Books, India; Lali Chatterjee, *The Exotic Life-styles of Subatomic Particles*, Kendall/Hunt Publishing Co.; Sheldon L. Glashow, *From Alchemy to Quarks: The Study of Physics As a Liberal Art*, Brooks Cole Pub. Co.; Leon Lederman & Dick Teresi, *The God Particle: The Universe Is the Answer, What is the Question?*, Delta; Steven Weinberg, *The First Three Minutes: Modern View of the Origin of the Universe*, Basic Books. **Journals:** *Physical Review*, *APS*; and *Journal of Physics*, *IOPP*

JL: Did you know as a young girl that you wanted to be a scientist?

Prof. Chatterjee: As a young girl I knew I wanted to study physics. I am not sure I initially thought of it in terms of a career and "wanting to be a scientist." Rather, I would describe it as intense interest and pleasure in studying physics and a desire for a life-long involvement in its pursuit and development. This, of course, is what a scientist does!

I fell in love with physics somewhere in high school around age 12 and it has been a lifetime involvement since. I also liked mathematics as a young girl and for a theoretical physicist a fluency in mathematics is an essential complement to the physics. It is awesome to experience the beauty of the universe through the esoteric language of mathematics. Yet, it is never just formulae or their predictions—for these must be intertwined with reality checks of the physical universe.

[A childhood story: I was brought up in Calcutta, India, and as the story goes, the noted physicist, Dr. Meghnad Saha (most noted for his work on Saha ionization), dropped by the house one day as he was a family friend. (My father helped maintain the local cyclotron at the University as an honorary service.) I took it upon myself to teach elementary mathematics to this doyen of science, - and he played along.]

JL: Isn't there a great educational tradition in your family and your family's involvement at Jadavpur University?

Prof. Chatterjee: There is certainly a great educational tradition in my family. My maternal grandfather was a world renowned philosopher who had a chair at University of Cambridge for many years and when he lived in India, international students went to study with him. My paternal grandfather was one of the leading lawyers at the time in India. Next generation, my father was a distinguished electrical engineer, (educated in England), and my mother is a poet, novelist and scholar of philosophy. My sister is an Art Historian, I could go on....

However, I was the only one in the family who was associated with Jadavpur University. I brought the first and only NSF International Division Research Grant to the Physics Department of the University and obtained gifts of equipment and brought many distinguished visitors from around the world to the University. I received the University Gold Medal and S.N. Bose Silver Medal for my Master's Degree examination and five students received their Ph.D.'s under my supervision.

JL: Who were your mentors at Jadavpur University?

Prof. Chatterjee: At Jadavpur U., my mentor was my thesis advisor **Prof. Topen Roy**. Prof. Roy was in turn a student of Professor S.N. Bose, famous for developing Bose-Einstein Statistics. Prof. Roy was a dynamic professor who also enjoyed giving lectures and demonstrations for the public and children.

[My undergraduate institution was Presidency College, one of those elite institutions that are so difficult to get accepted into. This was particularly so for physics which was the most competitive! In the physics major program, I was one of four girls in a class of about 40.]

JL: You've been involved in collaborative research in many world renown research centers such as: Fermi Labs, Jet Propulsion Labs, Oak Ridge (ORNL), Los Alamos, Goddard Space Flight Center, to name a few. I understand that you also work with large teams of physicists (such as at Fermi Labs). What's that like?

Prof. Chatterjee: As a theoretical physicist, I have worked in several different areas within the broad classification of nuclear and particle physics and their interface with atomic, molecular and astrophysics.

... I spent a large part of my early research career working on the interactions of an elementary particle, called the muon that lives for about 2 microseconds and usually partakes of many varied particle interactions and events. It is in connection with theoretical work in these areas that I collaborated with Goddard Space Flight Center and was visiting scientist at the other labs you mention I have also lectured at universities and laboratories around the world and until 1994, I was based primarily in India. (My long-time research involvement with the muon resulted in this particle being the heroine of my first novelette!)

Part of my collaborations with ORNL was theoretical research on heavy ion collisions and the production of quark-antiquark pairs in these. I also worked on Neutrino Physics and I received an NSF POWRE award in 2000 for this research which was carried out in collaboration with ORNL. My theoretical collaborations have been with small groups or individuals.

I have been involved in two large collaborations. The first was for study of muon-induced deep inelastic scattering as part of an international collaboration involving Fermilab, Illinois; University of Tennessee, Knoxville; other institutions in the U.S.; the University of Sendai, Japan; and other international participants. The research involved rare event scanning of bubble chamber film and analysis of data. I was responsible for supervision of the research of several post-docs and graduate students and we had to coordinate between the different international institutions and maintain similar guidelines for data analysis.

The other large collaboration I have been involved in has been the proposal to develop a neutrino facility near the Spallation Neutron Source under construction at ORNL.

JL: Can you talk a little about what it is like to be a physicist and being one of the few women in elite scientific research?

Prof. Chatterjee: It has been very challenging and interesting (and sometimes frustrating). There have been times that I have been the only woman scientist at a conference or meeting and the participation of women in others has been small at most. However, I am very happy to see that trend is changing for the better and the last few years I have seen many more women colleagues presenting papers and that is a heartening development. [There is sometimes a perception that a woman has to be like a man to succeed in science. I think we can be women and still be successful physicists.]

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From the Reference Desk

Column Editor: **Tom Gilson** (Head, Reference Services, College of Charleston) <gilson@cofc.edu>

Oceans cover a majority of our planet's surface and are essential to life. An understanding of their complexities is important and now there is a comprehensive six-volume encyclopedia devoted to their study. The *Encyclopedia of Ocean Sciences* (2001, 012227430X, \$1400) is another top-flight science reference from Academic Press. It is intended for a scholarly audience offering in-depth treatment of the physical processes, chemical properties, geological elements and biological life forms of the world's oceans.

As you would expect, the strength of this set is in the scientific facts and explanations provided. Over 400 scientists from universities, marine laboratories and oceanographic institutions worldwide contributed to the *Encyclopedia* and it shows. Articles range from the role of oceans in climate to the na-

ture of current systems in major oceans, and from fish behaviors like migration and reproduction to the influences of the carbon and nitrogen cycles. There are also essays on specific ecosystems like salt marshes, phenomena like marine snow and processes like iron fertilization. In addition, there is coverage of man-made impacts like fishing methods, ocean ranching, shipping, deep-sea drilling and oil pollution as well as discussions of coastal zone management, pollution control and fishery management. The text is full of illustrations, tables, charts, formulas and other visual representations that both complement the content as well as enliven the look of the set. A judicious use of color plates in each of the six volumes also contributes to the overall appeal. A traditional alphabetical arrangement is used and the set is heavily cross-referenced. However, use of the index is cumbersome. References are to page numbers with no reference to volume number. Add to that the fact there is no key indicating which pages are contained in each volume and you have a recipe for inconvenience. Partially making up for this is a table of content that lists the articles contained in each volume and includes "dummy entries" directing the reader to the relevant articles. This content list is repeated in each volume.

The *Encyclopedia of Ocean Sciences* gives the reader a sense of the vastness and interrelated nature of the discipline. It pro-

vides sophisticated background information for academic and professional audiences as well as guidance to specific research via its many bibliographies. First year undergraduates and informed laypersons may also find it of value, especially the introductions which start each article, but any future edition might consider a glossary to make the set more accessible to this audience. However, that's not the main concern here. This set is meant for any library serious about supporting marine science and oceanographic studies. For them, it will be an obvious purchase. As a bonus, Academic Press also offers access to an electronic version. Buyers of the set can register for Web access at <http://dx.doi.org/10.1006/rwos.2001>.

Science librarians and their patrons will also be pleased that Academic Press has recently published a third edition of a highly respected standard. Last published in 1992, the *Encyclopedia of Physical Science and Technology* (2002, 0122274105, \$3750.00) reflects the exponential growth of the field, as well as its evolving and changing components. However, this third edition is not a mere incremental update. The encyclopedia has been re-evaluated and changed in an involved process described by editor-in-chief, **Robert A. Meyers**, in his preface. According to Meyers some 200 articles from the second edition have been deleted while 300 new articles have been added and about 480 retained. These

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It is usually very difficult for women to overcome cultural barriers and to balance profession and home and to "try to do it all." It has been difficult in my case too, and encouragement and support from family has been very helpful. For me personally, physics has been somewhat a way of life and was something I just had to find time for.

I think this is why I see metaphoric images of the hidden sub-atomic world in everyday life. Spending a couple of decades writing only research papers, this entwining of life with physics manifested itself in my books and outreach efforts over the last few years.

JL: I understand that you are now involved in scientific publishing and that you are working on a project here in North America? Could you talk a little about that?

Prof. Chatterjee: I have joined Institute of

Physics Publishing, which is the publication section of the Institute of Physics, a learned society for physics, based in England. I find my new role both interesting and challenging. I have always enjoyed expanding my interests and feel I have contributed in meaningful ways not only to pure research but to education and physics outreach. I see my current role as contributing to the international dissemination of physics and interfacing between physicists and the publishing world. In the past I have been author and referee and it is informative to learn about the other side — almost like seeing the rear side of the moon!

I do intend to continue my pursuit of higher physics as I cannot imagine a life without that!

JL: What do you tell students—especially young women—who may be interested in pursuing a career in physics? It seems like an incredible time to be involved in science, but it is also a very difficult time to obtain grant funding and resources needed to do world-class research.

Prof. Chatterjee: I have in general tried to encourage all students to come to physics, but it is not always simple. Regarding young women, I think many more should come to physics. I have personally tried to encourage my women students to study physics and have succeeded in some cases. I think this trend is increasing as I remarked earlier and I hope the number of women in physics continues to grow. Regarding the problems of funding, these affect all students and it is important for us to continue public awareness of physics so that funding authorities recognize the importance of physics and its incredible role in every development and aspect of science.

JL: It is a pleasure to speak with you and thanks for taking time out of your busy schedule so that ATG readers can learn about your life and work in theoretical physics. Thank you very much.

Ed. Note: *FlnstP is the abbreviation for, Fellow of the Institute of Physics. — JL