

**Seeking N-lightenment, one cup at a time!  
*The Journey of Chai and Why?***

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**Summary:**

This isn't the Bodhi-tree kind of enlightenment, but tales of a journey involving Nitrogen containing semiconductors that emit light and efforts to take science out of the lab and into the public. I will mostly share the Chai-and-Why? experience which started off as small experiment in getting the Mumbai public excited about science and over the past decade has slowly redefined TIFR's science outreach efforts. Running without a break since 2009, Chai-and-Why? has covered a remarkable range of topics in over 220 sessions held till date and received a phenomenal public response. Innovative steps – children's vacation specials, hands-on experiments, festival-specific sessions, extensive use of social media etc. have pushed the boundaries of the traditional science café. Ideas developed at Chai-and-Why? were extended to develop interactive science-demos with local Marathi language versions being enthusiastically appreciated in rural Maharashtra and dramatically enhancing our engagement with a larger community.

About the speaker: Professor Arnab Bhattacharya is a scientist and science communicator at TIFR, Mumbai. After graduating from IIT-Bombay, he did his MS and Ph.D. at the University of Wisconsin-Madison, and worked in Germany before coming back to set up a research lab on semiconductor materials at TIFR. Arnab is passionate about science outreach, and enjoys talking about science and demonstrating science experiments to all audiences, particularly school/college students. He pioneered "Chai and Why?" Mumbai's popular fortnightly science café that has been running every two weeks without a break since 2009. Arnab is presently the chair of Science Popularization and Public Outreach at TIFR. He has received the 2010 Homi-Bhabha-Award in Science Education, the 2012 Chevening Rolls-Royce Fellowship for Science and Innovation Leadership, and the 2017 INSA Indira Gandhi Prize for the Popularization of Science. He also has a whole bunch of eclectic interests – including music, marathon running, cooking, photography, hiking, etc.

**Reconstructing Dark Energy**

Varun Sahni, FNA

**Summary:**

The recent discovery that the universe is accelerating suggests that the expansion of the universe could be driven by Dark Energy. The latter, unlike conventional forms of matter, has large negative pressure. While the cosmological constant provides a simple example of dark energy, its extremely small value raises some serious

theoretical issues. It has therefore been suggested that Dark Energy could be time dependent, and models as diverse as Quintessence, Chaplygin Gas, and Brane worlds have been suggested to fuel cosmic acceleration. In the presence of so many theoretical models it becomes meaningful to reconstruct the properties of dark energy from observations in a model independent manner. This is especially important given the extremely high precision measurements of cosmic expansion expected in the near future.

Professor Sahni also developed new statistical methods for analysing the properties of Dark Energy including the Statefinders and the Om diagnostic. Such model independent techniques determine the properties of dark energy directly from observational data without bias/preference to any theoretical model.

### **Dynamics of Galaxies: Effect of interstellar gas and dark matter halo**

Chanda J. Jog

Summary:

A galaxy disk consists of stars and interstellar gas, embedded in a dominant dark matter halo whose existence is deduced from observations. Our work has shown that the gas and halo both play a crucial role in determining the structure, dynamics and stability of galaxies. The gas, with its low dispersion, tends to support the growth of instabilities; while the dark matter halo has an opposite, constraining effect. Results on some topics - such as the disk stability, spiral structure, vertical disk structure, and modelling the density and shape of dark matter halo will be presented.