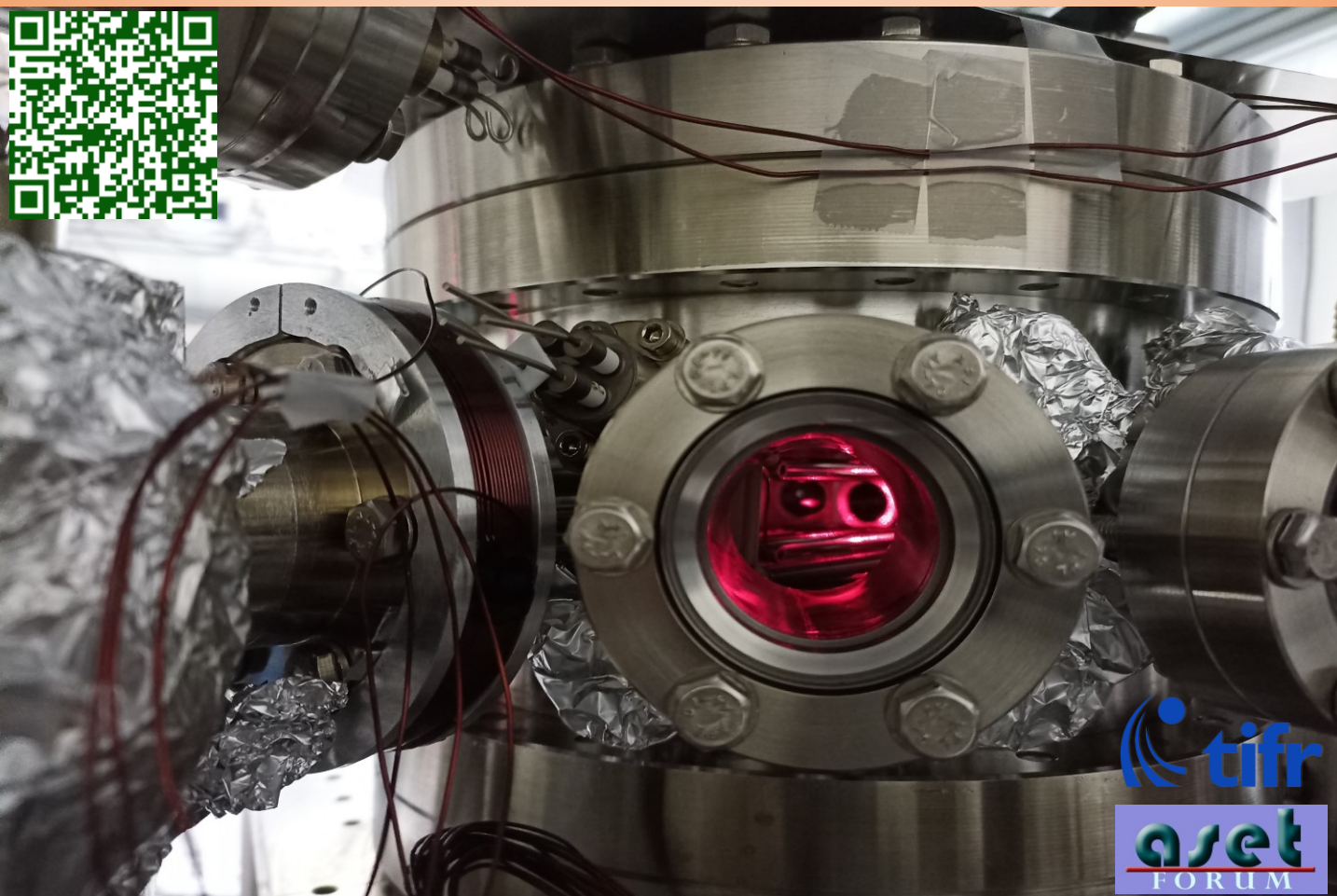




ASET Colloquium

Instrumentation for high resolution laser spectroscopy and laser cooling experiments in TIFR

Dr. Sourav Dutta, DNAP, TIFR



Friday, September 30, 2022 at 4 p.m.

Live YouTube Link: <https://youtu.be/TsJDbnlzQIO>

High-resolution laser spectroscopy continues to play a crucial role in improving our understanding of atomic structure. Some of these experiments are very attractive because they are conceptually simple. However, they may require several years of dedicated instrumentation to reach the required level of precision. In our lab, we have recently measured the hyperfine splitting of the 7d states of atomic cesium via two-photon spectroscopy with at least a ten-fold improvement in precision over earlier reports. We also recently achieved laser cooling and trapping of lithium atoms in a set-up that was built entirely in TIFR. Both these experiments rely heavily on tunable external cavity diode lasers (ECDLs) which we constructed in-house. In this talk, I will focus on the construction and operation of these seemingly simple ECDLs and discuss how we use these for high-resolution laser spectroscopy and laser cooling.

Sourav Dutta completed his Bachelor of Science degree in Physics from Presidency College, University of Calcutta, in 2005. He spent two years at the S. N. Bose National Centre for Basic Sciences to obtain his Master of Science degree before joining Purdue University as a graduate student in 2007. At Purdue, he built an apparatus for studies on ultracold polar molecules and demonstrated the production of ultracold molecules using photo-association. He returned to India in 2013 and worked on developing new ion cooling methods based on atom-ion collisions at the Raman Research Institute. In 2018, he joined TIFR Mumbai where he leads a laboratory that performs experiments on laser spectroscopy, quantum optics and ultracold atoms, molecules and ions.