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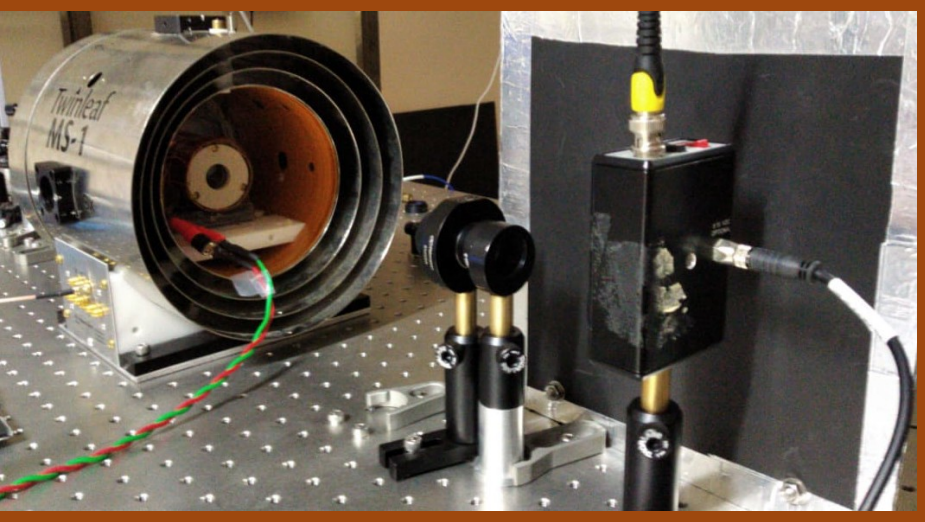
Atomic Sensors: Harnessing Atom-Light Interactions for Precision Magnetic Field Detection

Dr. G Rajalakshmi (Tata Institute of Fundamental Research, Hyderabad)



Dr. G Rajalakshmi is a scientist at the Tata Institute of Fundamental Research, Hyderabad. Her prime interests are in developing experimental techniques for probing fundamental aspects of science. She has build experiments for precision measurements of gravity and other fundamental interaction employing torsion balances, laser cooled atoms, and optical interferometers. She finished her PhD in experimental gravitation from Indian Institute of Astrophysics. In TIFR she has been working on experiments on spectroscopy of low temperature atoms, Gravitational wave detection using the LIGO interferometers and more recently nuclear magnetic resonance. Currently she is working on the interaction of light with atoms and materials for applications in atomic magnetometry and spin photonics.

Atomic sensors that exploit the interplay between atoms and light have emerged as powerful tools for measuring physical quantities with high precision. This talk will elucidate the fundamental principles underpinning these sensors and the factors that sensitivity that can be achieved with these systems. A particular focus will be on our recent work developing alkali vapour magnetometer with 1pT/sqrt(Hz) sensitivity and bandwidth of 25 kHz. By exploiting the atomic system's response to simultaneous electric and magnetic fields, we are exploring novel applications in fields such as zero-field NMR and atomic gyroscopy. These advancements could transform areas such as materials science and navigation, while also opening new doors for fundamental physics research.

Friday **13 SEPT**	**(Hybrid) Lecture Theatre AG 66, TIFR – 4 to 5 p.m.** **YouTube Live: https://youtu.be/xkKT9E2KjQY**

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