Joint Physics & IA/FORTH Colloquium

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PASIPHAE: A tomographic map of the galactic magnetic field clears the path to Inflation

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ABSTRACT

An inflation-probing B-mode signal in the polarization of the cosmic microwave background (CMB) would be a discovery of utmost importance in physics. Still, contamination from Galactic dust and other foreground signals keep this breakthrough out of reach. A critical piece of the foregrounds puzzle is the 3-d structure of the magnetic field threading dust clouds, which cannot be accessed through microwave observations alone, since they record integrated emission along the line of sight. Instead, observations of a large number of stars at known distances in optical polarization, tracing the same CMB-obscuring dust, can map the magnetic field between them.

The Polar Areas Stellar Imaging in Polarization High Accuracy Experiment (PASIPHAE) will deliver such a map combining novel-technology wide-field-optimized optical polarimeters (WALOPs) and an extraordinary commitment of observing time by the Skinakas observatory in Crete and the South African Astronomical Observatory. Such a map would not only boost CMB polarization foreground removal, but it would also have a profound impact in a wide range of astrophysical research, including interstellar medium physics, high-energy astrophysics, and galactic evolution.