

DEPARTMENT OF **PHYSICS & ASTRONOMY** SPEAKER SERIES

A frequency-modulated laser interferometer for nanometerscale position sensing at cryogenic temperatures

Adam Christiansen University of Lethbridge



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Everyone welcome!

The continually increasing sensitivity required for advancement of farinfrared astronomy dictates that the next generation of space-based observatories must employ cryogenically cooled telescopes and instruments. Interferometers pose particular challenges for cryogenic operation, including the need for robust low power dissipation cryogenic position metrology. Instrumentation must be cooled to <4 K to avoid a noise contribution from self-emission and often contain moving components whose position must be measured precisely at cryogenic temperatures. In this presentation I will discuss the motivation and requirements for position metrology within the context and goals of infrared astronomy. Next, I will present previous work within Astronomical Instrumentation

Group at the University of Lethbridge on the development and testing of a threephase homodyne interferometer for cryogenic metrology. Improving upon this work, I will present our current progress on the development of a frequencymodulated heterodyne interferometer for position metrology at cryogenic temperatures. In conclusion, I will share the results of preliminary testing and outline the directions and possibilities that this research will explore in future work.

