Contribution ID: **21** Type: **not specified**

Investigation of Frame-Dragging-Like Signals Close to Rotating Superconductors

Tuesday 28 August 2007 15:30 (45 minutes)

The search for frame dragging around massive rotating objects such as the Earth is an important test for general relativity and is actively pursued with the LAGEOS and Gravity Probe-B satellites. Within the classical framework, frame dragging is independent of the state (normal or coherent) of the test mass. This was recently challenged by proposing that a large frame-dragging field could be responsible for a reported anomaly of the Cooper-pair mass found in Niobium superconductors. In 2003, a test program was initiated at the Austrian Research Centers to investigate this conjecture using sensitive accelerometers and fiber optic gyroscopes in the close vicinity of fast spinning superconducting rings. The sensors are mounted in close proximity to the superconductor in a separate evacuated, mechanically and thermally de-coupled chamber. Recently obtained high-precision data show that the angular velocity and acceleration applied to the superconductor can indeed be seen on the sensors. The signal amplitude is about 8 orders of magnitude below the values applied to the ring for the case of Niobium at 4 Kelvin. The origin of the observed signals so far is not clear. Our measurements and analysis suggest that the signal can not be explained by mechanical influence or by carefully monitored magnetic fields surrounding the sensors. If the frame dragging-like signals are confirmed, their explanation must be sought outside of general relativity. This talk will give an overview of the initial motivations and the experimental program and discuss in particular the latest measurements using fiber optic gyroscopes. Possible error sources as well as the experimental difficulties are reviewed and discussed.

Presenter: Dr TAJMAR, Martin (Austrian Research Centers)

Session Classification: Quantum Gravity