Experimental report

26/01/2018

Proposal: 3-14-358 **Council:** 4/2015

Title: qBounce: Ramsey Spectroscopy to test Newtons Inverse Square Law at micron distances using UCN

Research area: Nuclear and Particle Physics

This proposal is a new proposal

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Samples: UCN

Instrument	Requested days	Allocated days	From	To
PF2 UCN	200	277	19/05/2016	16/07/2016
			18/09/2016	30/09/2016
			30/09/2016	07/10/2016
			04/11/2016	22/12/2016
			19/01/2017	08/03/2017

Abstract:

In the last years, gravity experiments have been experiencing a renaissance for several reasons: Modern astronomical observations clearly point to the existence of dark energy and dark matter. Their true nature and content remain a mystery however. Furthermore, prominent candidates to formulate a consistent quantum theory of gravitation require extra spatial dimensions.
The neutron is an ideal tool to answer such questions. More precisely, gravitational quantum states of ultra-cold neutrons connect gravity experiments at short distances with powerful resonance spectroscopy techniques. As in many other examples in science, this connection has the potential to an at least order-of-magnitude improvement in sensitivity.
Here, we propose to push the limits of the qBOUNCE experiments one step further and to apply Ramsey’s Method of Separated Oscillating Fields2. The measurement results will be used to test Newtonian Gravity on the 10-16 eV-level. This proposal is part of the joint research project AXION between the Austrian Science Fund FWF (H. Abele, Atominstitut) and the ANR (P. Geltenbort, ILL, ANR-2011-ISO4-007-02), for which an extension proposal will be submitted.

The experiment related to proposal 3-14-358 is on-going.
The experimental report will be provided after the end of the experiment.

Tobias JENKE
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