Contribution ID: **370** Type: **Oral Presentation**

Development of Kinetic Inductance Detectors with contactless feedline as heat sensors for rare events experiments

Friday, 26 July 2019 08:45 (15 minutes)

A common approach for experiments searching for rare events relies on measuring the effects of nuclear recoils on large arrays of massive cryogenic bolometers. Coupling a very high sensitivity to an easily multiplexable readout, Kinetic Inductance Detectors are excellent candidates for these experiments.

We have thus investigated the possibility of using KIDs to readout the heat pulses induced by events in massive crystals. The observed signal is a consequence of the cascade of athermal phonons produced by each event. To prevent the loss of signal due to the escape of the phonons to the thermal bath, or the rapid downconversion of their energy, it is therefore paramount to minimize the thermal contact between the crystal and the holder, and to remove all the unnecessary metallic films that could act as phonon traps.

For these reasons we have adopted an innovative approach, in which the readout is achieved by means of a contactless feedline. The feedline is deposited on a separate wafer, placed in front of the massive crystal on which the KID itself is fabricated. The readout is achieved by coupling to the KID through its irradiated electromagnetic field. This solution has the double effect of removing all metallic contacts between the crystal and its holder, and of leaving only the film of the detector as possible phonon absorbing area. It therefore represents a promising solution for future large scale arrays of cryogenic crystals.

We present the first realization of a KID on a massive 30g Silicon crystal with contactless feedline. The system has been irradiated with an Americium source, giving raise to both alpha (5.6MeV) and gamma (60keV) events. We report on the current performance of the system and on the steps we foresee to further improve them.

Student (Ph.D., M.Sc. or B.Sc.)

N

Less than 5 years of experience since completion of Ph.D

N

Primary authors: MONFARDINI, Alessandro (Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France); Dr JUILLARD, Alexandre (CNRS - IPNL Lyon, France); GOUPY, Johannes (Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France); Mr COLAS, Jules (ENS Lyon); BILLARD, Julien (CNRS - IPNL); CALVO, Martino (Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France); CAMUS, Philippe (cnrs); Mr GERMOND, Richard (Queen's University)

Presenter: Mr COLAS, Jules (ENS Lyon)

Session Classification: Orals LM 002

Track Classification: Detector readout, signal processing, and related technologies