**Institut de recherche sur les lois fondamentales de l'univers**

Séminaires d'Instrumentation

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## Dual readout calorimetry with meta-crystals


The meta-crystals concept is an approach that consists of using both undoped and properly doped heavy crystal ﬁbers of identical material as the active medium of a calorimeter. The undoped ﬁbers behave as Cherenkov radiators while the doped ones behave as scintillators. A dual readout calorimeter can be built with its sensitive volume composed of a mixture of both types of crystals. In addition if the calorimeter is adequately ﬁnely segmented it can also function as a particle ﬂow calorimeter at the same time. In this way one could possibly combine the advantages of both the particle ﬂow concept and the dual-readout scheme. We discuss the approach of dual readout calorimetry with meta-crystals made of Lutetium Aluminium Garnet (LuAG). We brieﬂy present
studies on the material development and ﬁrst testbeam activities and then focus on performance expectation studies based on simulation. We discuss in more detail the results from generic systematic scannings of the design parameters of a dual readout calorimeter. The design parameters under study include transverse and longitudinal granularity, sampling frequency/readout fraction of the scintillation/ionisation and the Cherenkov signals, total length of calorimeter, mixture of homogeneous and sampling dual readout components, corresponding composition etc. We close with a brief outlook on open issues and further R&D needed to proceed from an ideal conceptual case to the design of a realistic detector.