# Investigation of heavy inorganic scintillators for a fiber-based Compton camera

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Since proton therapy has become an important cancer treatment modality, the research towards quality assurance and online treatment monitoring has intensified. Detection of prompt gamma radiation emitted during the patient's irradiation is among the most promising methods for online monitoring of deposited dose distribution, with Compton camera type detectors being a natural choice for this purpose. Recent development in production of inorganic scintillators resulted in a variety of materials, many of which are characterized by large densities, excellent timing properties and light yield, as well as mechanical properties allowing to manufacture thin fibers. When combined with modern silicon photomultipliers (SiPMs), they allow compact and granular detector designs suitable for detection of several-MeV prompt gamma radiation.

In order to investigate properties of heavy inorganic scintillating materials a dedicated test-bench has been constructed. The study was focused on lutetium based crystals (LuAG:Ce, LYSO:Ce). All samples had an elongated, fiber-like shape with 1 x 1 $mm^2$ cross section and 100 mm length. The following properties of the materials have been investigated: attenuation length of the scintillating light, timing characteristics, energy resolution and light output. In those aspects LYSO:Ce was found to perform better than LuAG:Ce.