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Single Layer Gamma-Ray Polarimeter for Medical Imaging Applications and Fundamental Physics Research

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We will present an overview of the activities undertaken with the experimental system based on single layer gamma-ray polarimeter. This modular system consist of 16 position sensitive scintillator matrices read out by silicon photomultipliers. We have shown that these simple detectors can successfully measure the polarization of gamma rays via internal Compton scattering. Owing to its modularity the system can be exploited in various setups in fundamental research and medical applications. We will present three such setups: the first one for the measurements in Positron Emission Tomography, where the benefit of using the gamma-ray polarization was investigated, the second where the implications of decoherence of annihilation quanta were explored and the third, where triple-coincident measurement of gamma rays from ortho-positronium decay were done.

Authors: MAKEK, Mihael (Department of Physics, Faculty of Science, University of Zagreb); BOKULIC, Tomislav (Department of Physics, Faculty of Science, University of Zagreb); BOSNAR, Damir (Department of Physics, Faculty of Science, University of Zagreb); Dr GROŠEV, Darko (University Hospital Centre Zagreb); Prof. FRIŠČIĆ, Ivica (Department of Physics, Faculty of Science, University of Zagreb); KOŽULJEVIĆ, Ana Marija (Department of Physics, Faculty of Science, University of Zagreb); KUNCIC, Zdenka (University of Sydney, Australia); PAVELIĆ, Luka (Institute for Medical Research and Occupational Health); ZUGEC, Petar (Department of Physics, Faculty of Science, University of Zagreb); Dr PARASHARI, Siddharth (Department of Physics, Faculty of Science, University of Zagreb)

Presenter: MAKEK, Mihael (Department of Physics, Faculty of Science, University of Zagreb)

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