



Contribution ID: 272

Type: **Live Presentation**

## **TOPS: a new class of fast plastic scintillators**

*Wednesday, February 23, 2022 4:50 PM (20 minutes)*

Organic plastic scintillators are largely exploited for fast time detectors thanks to their short scintillation time wrt inorganic crystals. Plastic scintillators are cheap to produce, light and easy to manipulate (standard mechanical workshop can handle the cutting, polishing, etc..). The nowadays best (faster) plastic scintillators are EJ-232 (Eljen Technology) and BC-422 (Saint Gobain) with a rise time of 350 ps, a decay time of 1.6 ns and a pulse width of 1.3 ns. To improve the performances of time detectors the development of faster scintillators can give a crucial contribution, in this framework a collaboration between the physics, engineering, and chemistry groups of University "Sapienza" of Rome and CREF started the TOPS project, focused on the development of a new class of organic scintillators. Comparing the light output and the time properties of the samples with minimum ionizing particles, a selection of the most promising TOPS scintillators has been investigated and characterized (redout with commercial PMTs - Hamamatsu H10721-20). The performance achieved with TOPS samples are extremely promising: a time resolution improvement from 10 up to 35% with respect to the EJ-232 commercial scintillator has been demonstrated. In addition, an increase of light output has been obtained for all samples with a consequent potential improvement in energy resolution measurements of a factor up to 35%.

### **Primary experiment**

**Primary author:** MARAFINI, Michela

**Co-authors:** CARLOTTI, Daniele (INFN - Sapienza); DE GREGORIO, Angelica (INFN - National Institute for Nuclear Physics); SARTI, Alessio (Sapienza Universita e INFN, Roma I (IT)); SCIUBBA, Adalberto (INFN e Laboratori Nazionali di Frascati (IT)); TOPPI, Marco (INFN e Laboratori Nazionali di Frascati (IT)); Dr DE MARIA, Patrizia (Sapienza University of Rome, Post-graduate School in Medical Physics, Department of Medico-Surgical Sciences and Biotechnologies, Rome, Italy); DE SIMONI, Micol (Università di Roma "La Sapienza", Fisica, Rome, Italy); FISCHETTI, Marta (INFN - National Institute for Nuclear Physics); Prof. MATTIELLO, Leonardo (Sapienza University of Rome, Department of Basic and Applied Sciences for Engineering, Rome, Italy); FRANCIOSINI, Gaia (INFN - National Institute for Nuclear Physics); Prof. PATERA, Vincenzo (Sapienza University of Rome, Department of Basic and Applied Sciences for Engineering, Rome, Italy); SCHIAVI, Angelo (Università di Roma "La Sapienza"); Mr TRIGILIO, Antonio (Sapienza University of Rome, Department of Physics, Rome, Italy); TRAINI, Giacomo; Dr ROCCO, Daniele (Sapienza University of Rome, Department of Basic and Applied Sciences for Engineering, Rome, Italy)

**Presenters:** MARAFINI, Michela; TOPPI, Marco (INFN e Laboratori Nazionali di Frascati (IT))

**Session Classification:** Photon Detectors

**Track Classification:** Photon Detectors