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Plastic scintillator production involving Additive Manufacturing

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Plastic scintillator detectors are widely used in high-energy physics. Often they are used as active neutrino target, both in long and short baseline neutrino oscillation experiments. They can provide 3D tracking with 4π coverage and calorimetry of the neutrino interaction final state combined with a very good particle identification, sub-nanosecond time resolution. Moreover, the large hydrogen content makes plastic scintillator detectors ideal for detecting neutrons.

However, new experimental challenges and the need for enhanced performance require the construction of detector geometries that are complicated using the current production techniques. The solution can be given by additive manufacturing, able to quickly make plastic-based objects of any shape.

The applicability of 3D-printing techniques to the manufacture of polystyrene-based scintillator will be discussed. We will report on the feasibility of 3D printing polystyrene-based scintillator with light output performances comparable with the one of standard production techniques. The latest advances on the R\&D aim at combining the 3D printing of plastic scintillator with other materials such as optical reflector or absorber. The status of the R\&D and the latest results will be presented.

First author

Davide Sgalaberna

Email

davide.sgalaberna@cern.ch

Collaboration / Activity

3DprintScint

Primary authors: SGALABERNA, Davide (ETH Zurich); Dr KOSE, Umut (CERN); Dr T. SIBILIEVA (ISMA); Dr BOYARINTSEV, Andrey (ISMA); Dr T. NEPOKUPNAYA (ISMA); P. ZHMURIN (ISMA); BERNS, Siddartha (HEIG-VD); HUGON, Sylvain (HEIG-VD); DE ROECK, Albert (CERN); BOILLAT, Eric (EPFL)

Presenter: SGALABERNA, Davide (ETH Zurich)

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