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Title: Annual Physics Meetings

Type: Other

Dissemination level: public

WP number: WP5

Lead Beneficiary: INFN

Description:

Every year, a three-day training course for high school teachers and scientific journalists, “Incontri di Fisica”, is organized by the INFN Frascati National Laboratory. Participants attend dedicated lectures on Modern Physics and are then organized in small Working Groups (WG) for a hands-on training on specific experimental activities under the guidance of INFN researchers. For each WG, the tutors provide an introductory seminar on the specific subject followed by an active guide to activities in the laboratory. MUSE researchers from Frascati were leading, both in 2016 and 2017, a Working Group on “Particle Detection with Scintillating Materials” to introduce the experimental techniques used in calorimetry.

In the 2016 edition [1], held on 5-7 October, the working group was focused on readout techniques. The innovative SiPM photosensors, used in the Mu2e calorimeter, has been compared to traditional photomultipliers. The goal of the laboratory experience was to understand pros and cons of the two readout techniques. Moreover, a simple calorimeter built with plastic scintillating fibers has been used to show the light attenuation inside this material. The description of the activities carried out can be found in the MUSE web site, at the following link: <http://muse.lnf.infn.it/event/muse-idf-2016/>. In Fig. 1, the “Particle Detection with Scintillating Materials” WG is in the Mu2e clean room, where the training has been performed.

In 2017, the event “Incontri di Fisica” has been organized in the days 4-6 October [2]. Profiting of the availability of pre-production components of the Mu2e calorimeter, in this edition the “Particle Detection with Scintillating Materials” Working Group proposed the measurement of the properties of scintillating crystals and Silicon Photo-Multipliers (SiPMs). The training started with an introductory seminar on particle detectors and specific applications to calorimetry (Fig. 2). Other two presentations followed, describing the measurements planned for the hands-on activities:

1. F. Happacher - “Particle Detection with Scintillating Materials: introduction”
2. R. Donghia - “Test of Scintillating Crystals”
3. E. Diociaiuti - “Test of Mu2e SiPMs”



Figure 1: Working group on “Particle Detection with Scintillating Materials” during the 2016 edition of Incontri di Fisica.

Once in the Mu2e clean room, participants have been divided in two groups, and both of them have performed alternately some measurements of scintillating crystals and silicon photo-multipliers properties. For the crystals, light yield, longitudinal response uniformity and signal shape of pure CsI and BaF₂ crystals have been measured (Fig. 3). Results obtained for the two materials have been compared and discussed. For the SiPMs, I-V curves have been measured (Fig 4). This has been done both for irradiated and not-irradiated sensors at different temperatures. Also for this set of measurements, comparison of the results obtained with the two samples have been compared and discussed. Materials presented to the apprentices and a description of the event can be found at the following link: <http://muse.lnf.infn.it/event/muse-incontri-di-fisica-2017/>.

References

- [1] <http://www.lnf.infn.it/edu/incontri/2016/>
- [2] <http://www.lnf.infn.it/edu/incontri/2017/>



Figure 2: Introductory seminar for Incontri di Fisica 2017.



Figure 3: Test of scintillating crystals during the 2017 edition of Incontri di Fisica. On the left, the black tight-box used to test crystals is visible. Participants are analysing data to evaluate the optical properties of CsI crystals.



Figure 4: Test of Silicon photo-sensors during the 2017 edition of Incontri di Fisica. Participants are following the instructions needed to perform the measurements.