Contribution ID: **266** Type: **Poster**

Advances in Nuclear Emulsion Detectors

Tuesday, 22 May 2012 18:57 (0 minutes)

Nuclear emulsion detectors have been widely used in nuclear and particle physics field especially for their excellent position resolution. Nowadays the state-of-the-art scanning microscopes, conceived and realized for experiments on neutrino physics, allow us to exploit the emulsion detectors in many fields mainly for the automated emulsion scanning and fast read-out achieved. Possible applications can be envisaged for example in geophysics, in the investigation of large hidden structures; in medical diagnosis and therapy, for the control and the characterization of ion accelerated beams to optimize radiation therapy treatments and to assure high performances in the production of isotopes; and, naturally in physics. Each application field has of course its own needs, for example in terms of angular resolution, robustness, or tolerance in high vacuum. To accomplish the different requirements, the Laboratory for High Energy Physics (LHEP) of the University of Bern has established an underground nuclear emulsion laboratory for nuclear emulsion handling, where an R& D activity is ongoing on many kinds of emulsion films and detector modules to optimise their performances according to the different purposes. The status and perspectives of this activity will be presented and progress on nuclear emulsion detector properties will be reported.

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Session Classification: Applications - Poster Session

Track Classification: P2 - Applications