



Contribution ID: 230

Type: talk

## Stokes-shift engineered colloidal quantum dots as wavelength downshifters for detection of VUV light in LAr and LXe detectors

*Friday, 24 July 2015 14:45 (15 minutes)*

The detection of vacuum ultraviolet (VUV) radiation emitted by ionizing particles in large liquid Argon (LAr) or Xenon Time Projection chambers (TPCs) is of key relevance in experimental neutrino or dark matter search. Typical schemes use photodetectors coated with down-conversion dyes, such as tetraphenyl butadiene (TPB). The development of large-area waveguides based on TPB is, however, hampered by the strong spectral overlap between its absorption and emission spectrum that leads to severe optical losses. Colloidal quantum dots (QD) offer a promising alternative to organic dyes for VUV down-conversion thanks to their large absorption cross section and efficient narrow emission, that can be tuned so as to match the efficiency peak of chosen photodetectors. It has been recently shown that QD can be engineered so as to effectively decouple their absorption and emission functions and concomitantly suppress Auger recombination that typically affects the scintillation performances of conventional QDs. So called 'Stokes-shift engineered QDs' have been successfully applied to demonstrate large area LSCs with complete suppression of re-absorption losses for distances of tens of centimeters. Here we report VUV absorption and photoluminescence excitation spectra of Stokes shift engineered CdSe/CdS QDs up to 100 nm, that demonstrate the great applicative potential of this class of functional nanomaterials for VUV harvesting and down-conversion in LAr or LXe VUV measurement.

**Primary authors:** VEDDA, Anna (Sezione INFN e Dipartimento di Scienza dei Materiali, Università di Milano Bicocca, Milano, Italy); ROSSELLA, Massimo (Sezione INFN Pavia); BONESINI, Maurizio (Sezione INFN, Dipartimento di Fisica G. Occhialini, Università Milano-Bicocca); FASOLI, Mauro (Sezione INFN e Dipartimento di Scienza dei Materiali, Università Milano Bicocca, Milano, Italy); BROVELLI, Sergio (Dipartimento di Scienza dei Materiali, Università di Milano Bicocca, Milano, Italy)

**Presenter:** BONESINI, Maurizio (Sezione INFN, Dipartimento di Fisica G. Occhialini, Università Milano-Bicocca)

**Session Classification:** Neutrino Physics

**Track Classification:** Neutrino Physics