



Contribution ID: 127

Type: **Oral contribution**

Bubble-assisted Liquid Hole-Multipliers: bubble stability and electroluminescence in varying electrode configurations

Thursday, October 15, 2015 3:00 PM (20 minutes)

Liquid hole-multipliers (LHMs) have been suggested as a possible method for generating charge-induced proportional scintillation signals in single-phase noble-liquid time projection chambers (TPCs). Preliminary experiments have shown large scintillation yields in the holes of a Thick Gas Electron Multiplier (THGEM) immersed in liquid xenon. Further detailed studies have uncovered that the underlying mechanism is electroluminescence in xenon bubbles trapped below the THGEM electrode. In this talk we will present the results of additional investigations on the mechanism of bubble formation and sustainment in the noble liquid, as well as its correlation with the achievable energy resolution and stability. We will further discuss the electroluminescence process in different hole-multipliers and grid configurations.

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Session Classification: Contributed talks