

## Purity Monitor Studies in Medium Liquid Argon TPC

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**Abstract :** This paper is an attempt to describe some of the results that had been found through a journey of study in the field of particle physics. This study consists of two parts, one about the measurement of the cross section of the decay of the Z particle in two electrons, and the other deals with the measurement of the cross section of the multi-photon absorption process using a beam of laser in the Liquid Argon Time Projection Chamber. The first part of the paper concerns the results based on the analysis of a data sample containing 8120 ee candidates to reconstruct the mass of the Z particle for each event where each event has an ee pair with  $PT(e) > 20\text{GeV}$ , and  $\eta(e) < 2.5$ . Monte Carlo templates of the reconstructed Z particle were produced as a function of the Z mass scale. The distribution of the reconstructed Z mass in the data was compared to the Monte Carlo templates, where the total cross section is calculated to be equal to 1432 pb. The second part concerns the Liquid Argon Time Projection Chamber, LAr TPC, the results of the interaction of the UV Laser, Nd-YAG with  $\lambda = 266\text{nm}$ , with LAr and through the study of the multi-photon ionization process as a part of the R&D at Bern University. The main result of this study was the cross section of the process of the multi-photon ionization process of the LAr,  $\sigma_e = 1.24 \pm 0.10_{\text{stat}} \pm 0.30_{\text{sys}} \cdot 10^{-56}\text{cm}^4$ .

**Keywords :** ATLAS, CERN, KACST, LArTPC, particle physics

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