

# Characterization of time dependent distortions in the sPHENIX TPC using the Central Membrane

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## Abstract

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2 The Time Projection Chamber (TPC) is one of the subsystems essential for the success  
3 of the sPHENIX program. Charged particles which pass through the TPC ionize the gas,  
4 with the transverse position being given by the readout pad and the time for the ionization  
5 electrons to drift to the endcaps defining the z position. The ionization electrons are then  
6 clustered together in order to track particles and determine their momenta. In order to  
7 accurately track particles, calibrations must be performed and the performance of the TPC  
8 must be understood. As part of normal operations, space charge builds up within the TPC,  
9 leading to tracking distortions. These distortions must be accurately characterized over time  
10 such that they can be corrected as they change. This poster will show how the time dependent  
11 distortions are characterized in the sPHENIX TPC using a set of diffuse lasers incident on the  
12 Central Membrane. Aluminum stripes, deposited on the Central Membrane at well-surveyed  
13 positions, emit photoelectrons when struck by the diffuse laser, which can then be used to  
14 characterize the 3-dimensional distortions at the position of the Central Membrane. These  
15 distortions are then extrapolated to the endcaps of the TPC in order to provide corrections  
16 throughout its entire volume.