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## CMS GEM detector material study for the HL-LHC

A study on the Gaseous Electron Multiplier (GEM) foil material is performed to determine the moisture diffusion rate & saturation level and the moisture effects on its mechanical properties. The study is focused on the foil contact with ambient air and moisture to determine the value of the diffusion coefficient of water in the detector polyimide. The presence of water inside the detector foil can determine the changes in its mechanical and electrical properties. A simulated model is developed by taking into account the real GEM foil (hole's dimensions, shapes and material), which describes the adsorption on a sample. This work describes the model, its experimental verification, the water diffusion within the entire sheet geometry of the GEM foil, thus gaining concentration profiles and the time required to saturate the system and the effects on the mechanical properties.

### Experimental Collaboration

CMS

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