Contribution ID: **9** Type: **not specified**

Search for DM + top quarks at CMS and perspectives for the GEM upgrade

Tuesday, 21 December 2021 17:55 (10 minutes)

One of the main goals of modern particle physics is the discovery of Beyond Standard Model phenomena. There are a wide range of experiments that want to observe them., and among these there is the CMS Detector at the LHC. My work is studying a signature involving top quarks produced in association with Dark Matter candidates in proton-proton collsions with CMS data. The search is performed in a top quark and DM particles decay channel, with the top quark decaying hadronically. The work is focused on the reconstruction of top quarks through hadronic jets. The reconstruction can be done in three different scenarios, making use of jets reconstructed by Anti-kt algorithm with different radii: the entire top quark in a single large-radius, or AK8, jet, one AK8 jet for the W boson and one small radius, or AK4, jet for the b-quark, and three separate AK4 jets for the three quarks. Then Machine Learning algorithms were trained on the three different kinds of reconstructed top quarks to improve signal efficiency and background rejection.
During the last months I have been working on a new generation of detectors, the Gas Electron Multiplier, or GEM, that will be part of the CMS detector during the upcoming Run III. A study is done on the anomalous behaviour of currents/voltages (spikes, trips) observed at P5 (codename for the CMS location at LHC) during the stability test. The anomalies can lead to a permanent damage in the detectors, with this aim the CMS GEM group is organizing a series of tests to understand the nature of the anomalies and to avoid them. One of these took place at CERN during the last days, a test performed in presence of a magnetic field, to which I partecipated with the support of Napoli section group, making use of a custom-made, latest generation pico-ammeter developed specifically for the GEM detector of CMS.

Primary author: CAGNOTTA, Antimo (Istituto Nazionale di Fisica Nucleare)

Presenter: CAGNOTTA, Antimo (Istituto Nazionale di Fisica Nucleare)

Session Classification: Lightning talks