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Search for Dark Matter in signals of disappearing tracks at the CMS experiment.

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The SPRACE group has been involved in the search of physics beyond the standard model since the beginning of the CMS operation. We have studied a myriad of possible new models, exploring several signatures in the detector.

Currently, one of the most promising indications of new physics is the existence of Dark Matter. Its connection with particle physics, how it interacts (if it interacts at all) with the standard model particles remains unknown. Several models have been constructed to explain the Dark Matter abundance with consequences on the LHC energies. Since Dark Matter does not interact with the detector, its first signal will be the presence of a large amount of Missing Energy. Our group has explored the most basic signature, namely, missing energy plus a jet.

Recently, more sophisticated searches are being pursued. Usually models are built with the idea that the dark matter interacts with the SM particles via some mediator. One particular interesting signature involves the idea that this mediator is sufficiently long lived to leave a short track in the detector. How to reconstruct such a short track and how to estimate its possible backgrounds pose an extremely difficult challenge that we are investigating.

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