

Lepton Jets

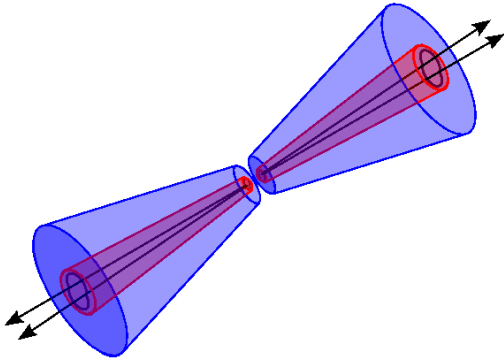
Introduction

This is a study motivated by a theory of dark matter, first suggested by Nima Arkani-Hamed in [this arXiv paper](#). He and Neal Weiner made a study of how it could be seen in the LHC and wrote [this paper](#).

We are currently working on the extension to this theory, suggested by Itay Yavin and others, which can be found [here](#). This paper describes in detail the phenomenology of the resulting models.

The papers aim to explain the recent slew of surprising high-energy astrophysics observations made by the ATIC and PAMELA experiments, as well as the DAMA experiment.

Experimental Signature



Dark gauge bosons, which can be produced by a number of exotic processes, are allowed to decay back to Standard Model particles. The signature is many leptons in the same cone, resembling a jet. For ATLAS, the leptons usually fall in the same ROI (Region of Interest), requiring additional trigger chains to be sensitive to these events. The SLAC group has been focusing on the muonic final state.

The highly collimated muons provide a distinctive signature in a final state which can be made relatively free of background using available experimental handles. With the larger cross-sections of the SUSY enhanced models, this analysis can begin to probe new regions of phase-space with a luminosity of $\sim 50 \text{ pb}^{-1}$.

Analysis

Further information can be found on the ATLAS [analysis page](#). You will need an ATLAS login to access it.

The analysis package can be checked out from the SLAC Institute SVN:

```
svn co svn+ssh://svn.cern.ch/repos/atlasgrp/Institutes/SLAC/LeptonJetsAnalysis/trunk LeptonJetsAnalysis
```

Further details on its use are in the included README.