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Search for a light Dark Matter mediator in the dijet mass spectrum from pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

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The ATLAS experiment has a rich program of searches for Dark Matter candidates. Most of them use a simplified model, where the colliding partons produce a mediator particle that decays into Dark Matter. For vector mediators, this approach produces limits competitive with direct detection experiments. However the limits become weaker for Dark Matter masses above 500 GeV, when the heaviest mediator produced in the LHC collisions decay off-shell. This limitation can be overcome by searching for a dijet resonance produced by the mediator decaying back into quarks. This method probes all Dark Matter masses bigger than half the mediator mass and is independent of the Dark Matter-mediator coupling. The current dijet search from ATLAS using 13 TeV pp collisions sets limits on mediator masses ranging from 1 TeV to 4 TeV. The lower limit is constrained by the high transverse momentum threshold in the unprescaled jet-based triggers. However the bounds from Dark Matter relic density prefer lighter mediators. This poster presents a new search where the mediator mass range probed goes down to 200 GeV, by triggering on events with an additional particle (jet or photon) coming from initial state radiation. The presence of the two resonance jets is used to further reduce the trigger rate in case of photon ISR.

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