



**Marcio de Sousa Mateus Junior** (a)

**Gustavo Gil da Silveira** (b)

(a) IF – UFRGS, RS, Brazil - E-mail: [msmateusjr@gmail.com](mailto:msmateusjr@gmail.com)

(b) IF – UFRGS, RS, Brazil | CERN – LHC – CMS - E-mail: [gustavo.silveira@cern.ch](mailto:gustavo.silveira@cern.ch)

---

# Investigation of the nature of a massive vector mediator for Dark Matter through $e^+e^-$ collisions

---

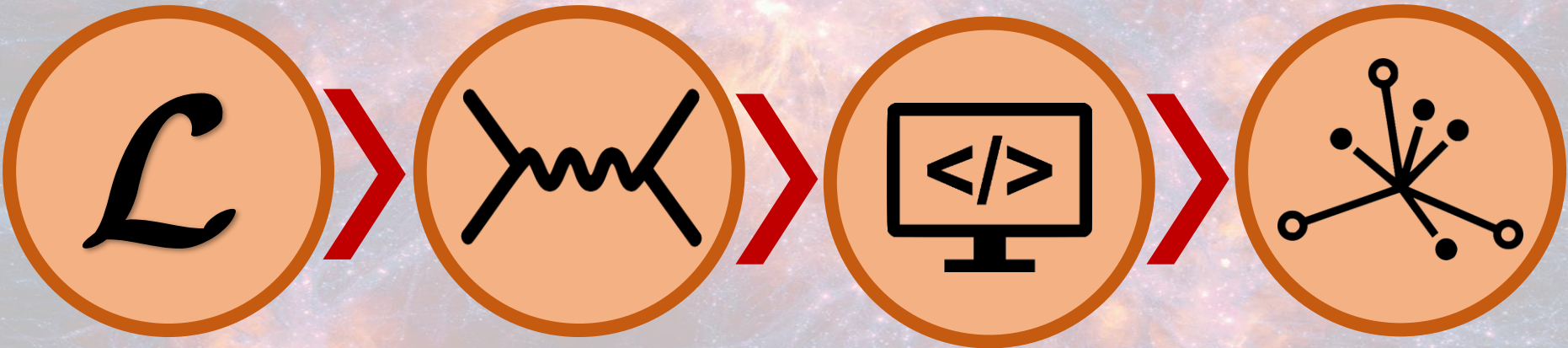


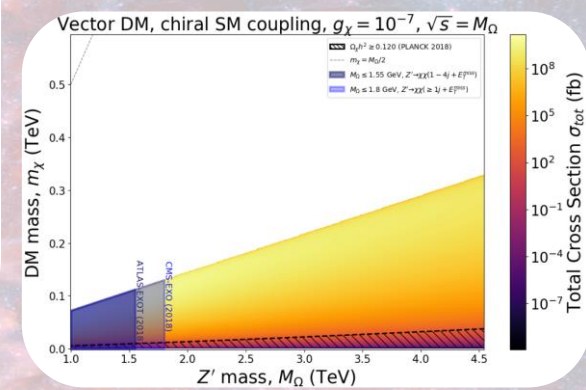
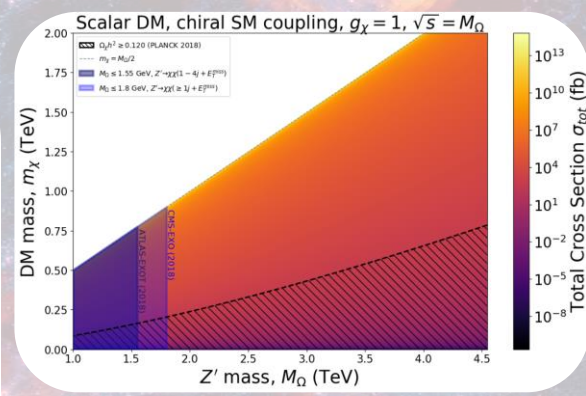
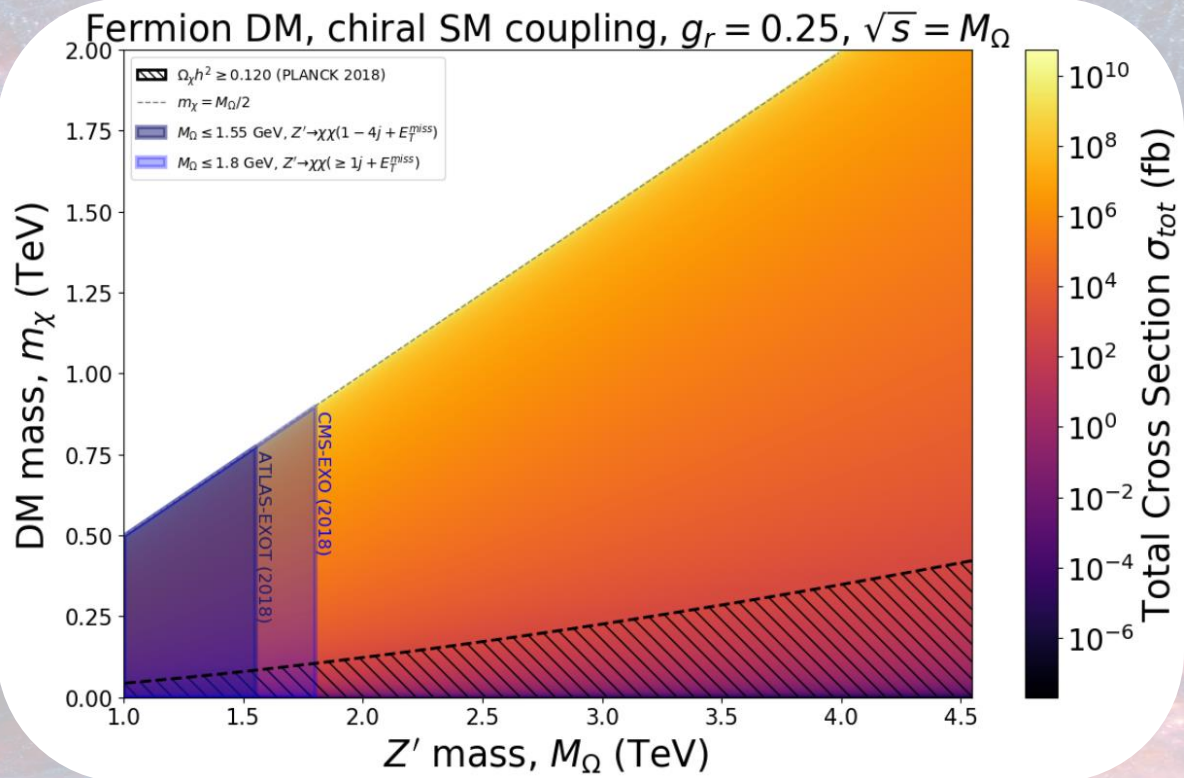
This work aims to investigate the interaction between fermions, more specifically electron-positron pairs, and DM particles through interaction of a new massive vector mediator,  $Z'$ . The production of scalar, fermionic, and vector DM pairs via electron-positron annihilation to this new boson was investigated, evaluating its total cross section in the center of mass frame. As a result, the possible values of the coupling constants between the DM and the SM were mapped according to the exclusion limits obtained by the CMS and ATLAS experiments and the Planck satellite. We show that there are several possibilities for mass ranges of this new massive mediator and for the particles of DM which are not excluded by the collider and astrophysical limits.

# Problem

Could different DM fields interact with SM fermions mediated by a new massive boson ( $Z'$ ) ?

# Approach





→ These results show that our models are within the parameter space probed in the experimental and cosmological limits. This work aims to further narrow our parameter space, especially the mediator mass range, with both existing data and new experiments such as the Future Circular Collider (FCC) and International Linear Collider (ILC).