20 May 2026 **Quiz number 10**

Phenomenology of Physics Beyond the Standard Model

FS 2026

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Mono-jet vs Di-jet searches

- Explain what is the meaning of MET+X searches. Why reconstructed visible particles are necessary for this type of searches?
- In the Mono-jet search, from where comes typically the high p_T jet ? Draw the diagram.
- What are the main backgrounds for the Mono-jet signature? How can QCD multi-jet be easily suppressed exploiting event kinematics?
- What is the difference between the Mono-Jet search and the Di-Jet search in term of the mediator decays? Looking at the plot in Figure 1, why the two searches can be considered as complementary ?
- What is the main experimental limitation for the Di-Jet searches in probing lower masses for the mediator ? What is the strategy that is usually adopted by these searches to overcome this limitation ? [1], [2],[3]

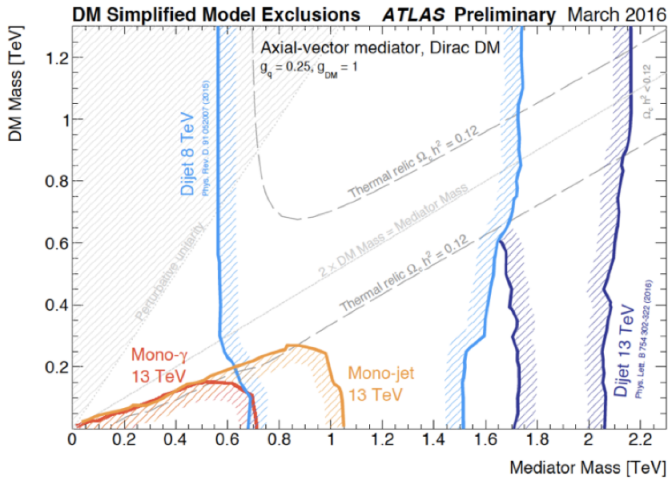


Figure 1: Comparison between Mono-X and Di-Jet searches

References

[1] Cesare Cazzaniga. "Leptons-enriched signatures for semi-visible jets". In: *Beyond Standard Model: From Theory to Experiment*. 2024. DOI: 10.31526/ACP.BSM-2023.9.

[2] Jonathan Butterworth et al. "MITP Colours in Darkness workshop summary report". In: (Nov. 2023). arXiv: 2311.16330 [hep-ph].

[3] Tulika Bose et al. "Report of the Topical Group on Physics Beyond the Standard Model at Energy Frontier for Snowmass 2021". In: (Sept. 2022). arXiv: 2209.13128 [hep-ph].