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# Production of Mono-Higgs and Mono-Z in the Minimal Spin-one Isotriplet Dark Matter Model in pp Collisions

*Thursday 12 January 2023 16:20 (20 minutes)*

One of the current topics in Particle Physics is the attempt to understand the nature of dark matter, through the predictions of simplified but realistic models. In this case we will focus on the Minimal Vectorial Dark Matter Model [1], where dark matter is the neutral component of a massive spin 1 field that transforms into the adjoint representation of $SU(2)_L$. The model has two free parameters: the mass of the vector at tree level and the coupling constant between the massive vector field and the Higgs field. Using the CalcHep package [2], this presentation will show production at tree level of a Z boson and a Higgs boson in the context of the vector model, which in principle, can be put to the test in future hadronic accelerators ( such as HL-LHC). We will present our cross-section predictions and them with the Standard Model .

The lagrangian of VDTM is described by:

\begin{align*}
\mathcal{L}=&\mathcal{L}{SM}-Tr\{D\mu V_\nu D^\mu V^\nu\}+Tr\{D_\mu V_\nu D^\nu V^\mu\}-\dfrac{g^2}{2}Tr\{[V_\mu,V_\nu][V^\mu,V^\
&-igTr\{W_{\mu\nu}[V^\mu,V^\nu]\}+M^2Tr\{V_\nu V^\nu\}+a(\Phi^\dagger\Phi)Tr\{V_\nu V^\nu\}
\end{align*}

References:

[1] Alexander Belyaev, Giacomo Cacciapaglia, James McKay, Dixon Marin, and Alfonso R Zerwekh. Minimal spin-one isotriplet dark matter. Physical Review D,
99(11):115003 (2019) \newline
[2] Alexander Belyaev, Neil D Christensen, and Alexander Pukhov. Calchep 3.4
for collider physics within and beyond the standard model. Computer Physics
Communications, 184(7):1729–1769 (2013)

**Author:** BENITEZ IRARRAZABAL, Gonzalo

**Co-author:** Dr ZERWEKH ARROYO, Alfonso (Universidad Técnica Federico Santa María)

**Presenter:** BENITEZ IRARRAZABAL, Gonzalo

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