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Some Theoretical Aspects of Multi-Higgs Models

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The Standard Model (SM) of Particle Physics describes the fundamental forces in nature. It accounts for all observed subatomic particles and even predicted the existence of the Higgs boson, which was observed for the first time in 2012. However it also has its shortcomings, such as the inability to explain why there are three generations of fermions, the values of fermion masses, including neutrino masses, the baryonic asymmetry in the universe, or the existence of dark matter (DM). The development of Multi-Higgs models intends to address these problems. It consists essentially in an extension of the scalar sector of the Standard Model by N scalars. In this thesis, we study the Dark Matter problem. We start by studying the theoretical aspects of extended scalar sectors. We will then use those results to develop models for DM consistent with the existent experimental constraints.

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