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A light scalar WIMP through the Higgs portal

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If dark matter (DM) simply consists in a scalar particle interacting dominantly with the Higgs boson, the ratio of its annihilation cross section—which is relevant both for the relic abundance and indirect detection—and its spin-independent scattering cross section on nuclei depends only on the DM mass. It is an intriguing result that, fixing the mass and direct detection rate to fit the annual modulation observed by the DAMA experiment, one obtains a relic density in perfect agreement with its observed value. In this talk we update this result and confront the model to the recent CoGeNT data, tentatively interpreting the excess of events in the recoil energy spectrum as being due to DM. CoGeNT, as DAMA, points toward a light DM candidate, with somewhat different (but not necessarily incompatible) masses and cross sections. For the CoGeNT region too, we find an intriguing agreement between the scalar DM relic density and direct detection constraints. We also give the one σ region favoured by the CDMS-II events, that suggest a light DM candidate too, and the limits from Xenon10 2009 data, which, depending on the assumed scintillation efficiency, may exclude both CoGeNT and DAMA. Assuming CoGeNT and/or DAMA to be due to DM leads to definite predictions regarding indirect detection and Higgs search at the LHC.

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