Abstract

In the WIMP scenario, there is a one-to-one relation between the dark matter (DM) relic density and spin independent direct detection rate if both the annihilation of DM and its elastic scattering on nuclei go dominantly through Higgs exchange. In particular, for DM masses much smaller than the Higgs boson mass, the ratio of the relevant cross sections depends only on the DM mass. Assuming DM mass and direct detection rate within the ranges allowed by the recent DAMA collaboration results -taking account of the channeling effect on energy threshold and the null results of the other direct detection experiments- gives a definite range for the relic density. For scalar DM models, like the Higgs portal models or the inert doublet model, the relic density range turns out to be in agreement with WMAP. This scenario implies that the Higgs boson has a large branching ratio to pairs of DM particles, a prediction which might challenge its search at the LHC.