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The XENON100 Dark Matter Experiment

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Abstract content
   (Max 300 words)
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The XENON100 experiment, situated in the Laboratori Nazionali del Gran Sasso, aims at the direct detection of dark matter in the form of weakly interacting massive particles (WIMPs). It uses liquid xenon (LXe) in a time projection chamber (TPC) to search for xenon nuclear recoils resulting from the scattering of WIMPs. The active region of XENON100 contains 62kg of LXe, surrounded by a LXe veto of 99kg, both instrumented with photo multiplier tubes (PMTs) operating inside the liquid or or in xenon gas. The LXe target and veto are contained in a low-radioactivity stainless steel vessel, embedded in a passive radiation shield. I report on a search for particle dark matter for 13 months during 2011 and 2012 using XENON100. XENON100 features an ultra-low electromagnetic background of (5.3±0.6)×10ˆ-3 events/(kg×day×keVee) in the energy region of interest. A blind analysis of 224.6 live days × 34 kg exposure has yielded no evidence for dark matter interactions. The two candidate events observed in the pre-defined nuclear recoil energy range of 6.6-30.5 keVnr are consistent with the background expectation of (1.0±0.2) events. A Profile Likelihood analysis using a 6.6-43.3 keVnr energy range sets the limit on the spin-independent elastic WIMP-nucleon scattering cross section for WIMP masses above 8 GeV/cˆ2, with a minimum of 2 × 10ˆ-45 cmˆ2 at 55 GeV/cˆ2 and 90% confidence level.

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PhD

Main supervisor (name and email)
and his / her institution

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No

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