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Dark matter direct detection: present scenario and future prospects

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Profound evidence for the existence of dark matter has been collected throughout the past 100 years. However, its exact nature remains elusive. A large effort is being put into the search for direct detection of weakly interacting massive particles (WIMPs), which arise as dark matter particle candidates in various theories. The search is led by dual-phase liquid xenon time projection chambers for masses above 5 GeV/c2. The most sensitive experiment, XENON1T, probes spin-independent (SI) WIMP-nucleon interactions down to 4.1 × 10−47 cm2 for 30 GeV/c2 WIMP mass. This limit refers to the SI isoscalar channel, which, for vanishing momentum transfer q, scales quadratically with the number of nucleons A. The SI interaction thus yields the dominant nuclear response, making it the standard search channel in the field.
We will browse through the different technical approaches used in the present dark matter direct detection scenario as well as its future prospects.

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