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Two-phase emission liquid xenon detector RED100 for rare events search at ground level laboratory

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The RED100 is a two-phase emission liquid xenon detector to search for rare events such as coherent elastic neutrino nucleus scattering (CEνNS) and neutrinoless double positron decay (0ν2β+). To detect these processes detector was specially built to work at ground level laboratory with intensive muon background.The RED100 experimental setup consists of several systems that provide stable and effective operation. These systems are the detector itself located inside a shielding, cryogenics, purification, electronics and data acquisition. High muon flux leads to PMT ageing and drastically increases single electron noise. Active voltage dividers and electron shutter were specially designed to overcome these issues. The detector principle of operation and design are described in detail. The first experimental run with 200 kg of LXe has been recently completed. The detector worked stable over 2 months. The main experimental results including liquid purity and single electron rate are presented. The projects of experiments to detect CEνNS and 0ν2β+ decays are presented as well.

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