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R11410-21 3-Inch Photomultiplier Tube for XENON1T Dark Matter Experiment.

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To satisfy the requirements of the next generation of dark matter detectors based on the dual phase TPC, Hamamatsu, has developed the R11410-21 photomultipler tube. We present the results of the detailed measurements of various PMT characteristics. High QE (>30%) accompanied by a low dark count rate (50 Hz at 0.3 PE) and high gain (10^7) with good single PE resolution have been observed. A comprehensive screening measurement campaign is ongoing while the manufacturer quotes a radioactivity of 20 mBq/PMT. Several tests in LXe were performed in environments similar to a dark matter detector setup. These measurements show the R11410-21 to be particularly suitable for the forthcoming zero background liquid xenon detectors.

Primary author: Dr LYASHENKO, Alexey (UCLA)

Presenter: Dr LYASHENKO, Alexey (UCLA)

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