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Ultra-pure electroforming at Boulby deep underground laboratory

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Rare-event search experiments, for example those looking for dark matter and neutrinoless double beta decay, require increasingly sensitive detectors. A critical aspect of this, is the reduction of backgrounds from detector materials, especially those in contact with the sensitive volume. High-grade copper is an attractive construction choice, due to its commercial availability and lack of long-lived radioisotopes. Despite this, copper can still represent a dominant background, with impurities from the ore, implanted during manufacture or from cosmogenic activation. Underground additive-free electroforming provides a method to produce ultra-pure copper parts with orders of magnitude reduction in background. In this contribution, the now finished construction of a copper electrodeposition facility at Boulby, the UK's deep underground laboratory, will be outlined which is key for several future experiments. One such experiment DarkSPHERE, a large diameter spherical proportional counter, will be presented along with the near-term plan to electroform a 30cm spherical proportional counter as the first step towards its construction.

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