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A high precision calorimeter for the CeSOX experiment

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The Ce-SOX experiment is being built to clarify neutrino anomalies by observing possible short distance neutrino oscillations. For this purpose, a 100 kCi ^{144}Ce - ^{144}Pr antineutrino generator will be placed under the BOREXINO detector at the Laboratori Nazionali del Gran Sasso in Italy. Thanks to its large size and very low background, BOREXINO is an ideal detector to discover or refute eV-scale sterile neutrinos. To reach the maximal sensitivity, we aim to determine the neutrino flux emitted by the antineutrino generator with a <1% accuracy. With this goal, INFN Genova and TU München are developing a vacuum calorimeter, which is designed to measure the source-generated heat released into a water coil, by measuring the flow and the temperature difference between the input and output lines with high accuracy. The system's design has been optimized to minimize heat losses, paying attention to conduction and infrared radiation, while keeping within the tight dimensional limits imposed by the available space. The entrance water temperature and flow stability will be strictly controlled to ensure the <1% activity measurement accuracy. The calorimeter is designed to meet the requirements of a possible second phase of the SOX experiment with a neutrino Cr-51 source (Cr-SOX).

This presentation will discuss the present status including details on the embedded technologies, the stringent material selection aimed at satisfying the highest vacuum, thermal and safety requirements.

Collaboration

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