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Filter Cavities for Squeezing in the Einstein Telescope: Design and Challenges

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The Einstein Telescope (ET) is a next-generation observatory for gravitational waves. It will push sensitivity beyond current detectors. One major challenge is quantum noise. This limits the detector at both low and high frequencies. The baseline design uses frequency-dependent squeezing to reduce this noise. It includes two filter cavities (FCs) for the low-frequency interferometers and one for the high-frequency interferometer.

This talk focuses on the filter cavities. I will start with the global timeline of the R&D phase. Then I will explain why FCs are essential in the ET design. The main part of the presentation will cover current design efforts. I will discuss how the cavities can be placed in the ET infrastructure. I will also look at questions around cavity length and type. Two-mirror and three-mirror cavity options will be compared. I will mention ideas like using a single tunable cavity instead of two. I will also briefly touch on alternatives such as EPR entanglement.

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Classification de Session: Contributions (15' + 5' de questions)