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Research and development of crystalline suspensions for ET-LF

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The Einstein Telescope will utilise cryogenic cooling in the low-frequency detector, and will therefore require crystalline materials in the suspension and optical components. The material properties of these suspension materials should not limit the thermal noise performance, requiring low mechanical loss, high thermal conductivity, and suitable tensile strength. With this, there is an increasing need for novel techniques in suspension fibre fabrication and jointing. The two main material candidates are sapphire and silicon, both of which have promising cryogenic properties, but require detailed characterisation to inform realistic thermal noise models. We report recent developments from the suspensions division in fibre production and jointing methods, and updated experimental characterisation results with the aim of producing realistic thermal noise curves for both sapphire and silicon suspensions.

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