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Ground Motion Analysis for the Einstein Telescope: ShakeMap, Seismic Hazard, and Case Studies

The Einstein Telescope (ET) project, a significant leap in gravitational wave observatories, demands an exceptionally stable environment to minimise seismic noise. To ensure the most suitable site selection, we conducted a meticulous ground motion analysis, integrating historical and recent instrumental earthquakes relevant to the area. By utilising ShakeMaps and severe ground motion measurements (e.g., Peak ground acceleration, Peak spectral acceleration at several periods), we were able to parameterise key seismic events and evaluate expected shaking patterns in a comprehensive manner.
We analysed scenarios including historical relevant earthquakes at Euro-Mediterranean scale. By comparing estimated shaking levels with European seismic hazard models, we provide a comprehensive overview of the expected ground motion at the site. These findings, which contribute to a refined understanding of site suitability for ET, are of utmost importance in ensuring optimal conditions both for the future gravitational wave observations and the long-term operativity of ET infrastructure and its duty cycle.

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