Title of the science letter goes here

SUMMARY

Brief summary of the science letter goes here. Science letters are informal public documents that will explore the scientific potential of next-generation (XG) gravitational-wave observatory networks. Each science letter should contain a maximum of 2 pages of text and figures, plus authors and relevant references. They should use clear and straightforward language that is understandable for scientists from a variety of fields.

Key question(s) and scientific context in brief

Explain the key science question or questions and provide a brief summary of the current status of the field on these questions.

Potential scientific impact of XG detectors on the key questions

An XG network may include a combination of Cosmic Explorer, Einstein Telescope, Nemo, and upgraded detectors in current and planned 4km-scale facilities (LIGO-US, LIGO-India, Virgo, KAGRA). Science Letters should focus on desired observational capabilities rather than specific sites or configurations. Please refer to Evans et al. 2021 for the Cosmic Explorer Horizon Study.

Benchmarks for XG detectors to enable the scientific impact

Science letters are encouraged to suggest benchmarks that will ensure that the XG network is capable of the breakthrough science that they describe. A benchmark should represent a desired observational capability, such as detection rate or sensitivity, that can be used to differentiate between potential XG networks. Science Letters should explain how reaching certain benchmarks would ensure that gravitational-wave astronomy contributes to new knowledge pathways. References should support evaluating the maturity of the benchmark values and enable a more detailed understanding where needed.

Example benchmarks could include:

- Characteristic strain sensitivity between 10 and 100 Hz.
- Number of sources with 10 deg^2 localization available 5 minutes before merger.
- Number of BBH mergers detected per year with SNR> 600.
- Number of BBH and BNS detected at redshift larger than 2.
- Horizon distance for BNS observations relative to peak star formation redshift.
- Integrated 1-year sensitivity to stochastic backgrounds with a fractional energy density in gravitational waves GW(f).
- Sensitive range for a burst that releases EGW of $10^{-9}\,\mathrm{M\,c^2}$ at $1\,\mathrm{kHz}$.
- Ellipticity of known pulsars that would give measurable quadrupole emission for.
- Sensitive range for a long-duration source of some characteristic timescale and h_{RSS}.

SCIENTIFIC IMPACT OF XG DETECTORS

List of foreseen science breakthroughs goes here.

Dependencies on other multi-messenger capabilities

Only if needed, provide a brief description of other observational capabilities that are required to address the key question(s).

XG DETECTOR AND NETWORK REQUIREMENTS

Each science letter should outline the capabilities and timelines needed for an XG network to address a specific science question.

Authors

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Bibliography

[1] Matthew Evans et al. "A Horizon Study for Cosmic Explorer: Science, Observatories, and Community". In: *arXiv e-prints*, arXiv:2109.09882 (Sept. 2021), arXiv:2109.09882. DOI: 10.48550/arXiv.2109.09882. arXiv: 2109.09882 [astro-ph.IM].