

Pedagogical Strategies & Primordial Gravitational Waves, a History and Conception through Newtonian & Relativistic Physics A Research Paper by Systematic Review as My Subheading Following PRISMA Guidelines

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Abstract

Primordial gravitational waves (PGWs) provide a potential observational window into the early Universe and a conceptual bridge between classical gravitation, general relativity, quantum field theory in curved space-time, and modern cosmology. This systematic review aims to examine the historical and theoretical development of gravitational-wave concepts from Newtonian gravitation to relativistic space-time dynamics, and to synthesize literature on the proposed production, evolution, and observational constraints of primordial tensor perturbations. Following PRISMA 2020 reporting guidance, the review will use a documented search strategy across relevant scholarly databases and repositories, including NASA Astrophysics Data System (ADS), INSPIRE-HEP, Scopus, Web of Science, arXiv, Crossref, and Google Scholar, subject to access. Eligible sources will include foundational theoretical works, peer-reviewed research and review articles, observational collaboration papers, authoritative textbooks, and relevant science-education literature. Records will be reduplicated, screened against predefined eligibility criteria, and extracted using a structured matrix recording source type, methods or assumptions, findings, limitations, and relevance to teaching. Where feasible, major claims will be triangulated across at least five sources, while accounting for dependence between papers and shared datasets. The synthesis will distinguish established results—such as the direct detection of astrophysical gravitational waves—from model-dependent predictions and the absence, to date, of a conclusive detection of an inflationary primordial background. A second objective is to translate the physics literature into pedagogical strategies for high-school, undergraduate, and postgraduate education, including conceptual progression, use and limits of analogies, scientific discourse, data interpretation, and formative assessment. The review is intended to support both scientists and educators by linking theoretical accuracy with accessible teaching design. The protocol and reporting will disclose search dates, screening decisions, exclusions, and limitations; no study counts or conclusions will be reported until the searches and synthesis are completed. Keywords: primordial gravitational waves; Newtonian gravitation; general relativity; inflation; tensor perturbations; cosmic microwave background; PRISMA 2020; systematic review; science education; pedagogical strategies