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Abstract

Developing a Cosmology Unit for Year 10 Students to Determine Hubble's Constant Using Gravitational Waves †

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Abstract: Modern science curricula contain the foundations and scaffolding to allow the syllabus to include modern physics concepts that are not normally taught. The Big Bang can be refined to include how gravitational waves are being used to determine Hubble's Constant. Students will develop background knowledge about concepts such as expansion of spacetime, particle-antiparticle production in the early universe, emission/absorption spectra, and redshift which will enable them to appreciate the meaning and significance of Hubble's Constant. The work of Slipher, Lemaitre, and Hubble provide a case study for Science as a Human Endeavour. Science Inquiry Skills are included through activities on redshift, parsecs, and the Hubble Constant. The content of the unit is presented using practical activities, models, worksheets, videos, power points, and consolidation questions. Student and teacher feedback will be used to gauge the effectiveness of the unit; including the ability of the students to grasp the concepts, the students' level of enjoyment, and the teacher's feelings on facilitating the unit. In this presentation, I will introduce an approach to cosmology in which students learn about the Hubble Constant, and how gravitational waves allow its measurement without reference to the complex and messy cosmic distances ladder.

Keywords: modern science; gravitational waves; hubble constant

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