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A Research Informed Approach to Teaching Cosmology to Our Society's Future Leaders

EDWARD PRATHER, University of Arizona - Center for Astronomy Education

We recently completed a large-scale, systematic study of general education introductory astronomy students' conceptual and reasoning difficulties related to cosmology. As part of this study, we analyzed a total of 4359 surveys (pre- and post-instruction) containing students' responses to questions about the Big Bang, the evolution and expansion of the universe, using Hubble plots to reason about the age and expansion rate of the universe, and using galaxy rotation curves to infer the presence of dark matter. We also designed, piloted, and validated a new suite of five cosmology Lecture-Tutorials. We found that students who use the new Lecture-Tutorials can achieve larger learning gains than their peers who did not. This material is based in part upon work supported by the National Science Foundation under Grant Nos. 0833364 and 0715517, a CCLI Phase III Grant for the Collaboration of Astronomy Teaching Scholars (CATS). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.