

Probing the Early Universe Particle Content with Primordial Messengers

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Some of our best ideas on early universe physics are about to be put to the test by an unprecedented array of cosmological probes. The data these will collect span a vast range of scales, from the CMB to large scale structure, from pulsar timing arrays all the way to laser interferometers. This combined wealth of new information holds the potential to transform not just our understanding of cosmology, but also particle physics. Probing the earliest accessible epoch, the accelerated expansion known as inflation, is absolutely crucial: inflation can provide a cosmological portal to otherwise inaccessible energy scales. This is the “cosmological collider” idea. The spectacular success of the inflationary paradigm in explaining the origin of cosmic structure demands that we tackle a number of compelling questions still in need of an answer:

- what is the energy scale of inflation?
- what fields were active during inflation?

In this talk I will review recent progress on the inflationary field content focussing on an effective theory approach. I will also highlight key observables, starting with primordial gravitational waves, and discuss the prospect for detection.

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