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Loop quantum gravity and the very early universe

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Since the standard cosmological perturbation theory is based on QFT on curved space-times, it is not applicable in the Planck era. Using techniques from loop quantum gravity, the theory is extended to overcome this limitation. The new framework sharpens conceptual issues by distinguishing between true and apparent trans-Planckian difficulties and shows that the true difficulties can be generically overcome in the standard inflationary scenario, with interesting lessons for both theory and observations. The talk will be based largely on some recently completed joint work with Ivan Agullo and William Nelson.