

THE PROBLEM IN SPACE-TIME SINGULARITIES WHERE DOES THIS LEAD US IN COSMOLOGY?

STAG Public Lecture
By Physics Nobel Laureate Sir Roger Penrose

WEDNESDAY 20TH OCTOBER 2021 | 2.30 PM
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The singularity theorems of the 1960s showed that not only are the space-time singularities of gravitational collapse generic expectations of classical general relativity, but so also is the big-bang singularity a generic phenomenon (work largely by Stephen Hawking) for a rapidly expanding early universe. Whereas the mathematical arguments are time-symmetric in this way, our physical expectations (profoundly related to the 2nd Law of thermodynamics) are very different for the two types of singularity. The common view is that the resolution of the singularity problem must be through quantum gravity, but this cannot resolve this gross and fundamental time-asymmetry problem.

Conformal geometry provides a completely different outlook, which not only resolves this issue, but leads to observational implications that appear to be strongly confirmed in recent analyses of the cosmic microwave background radiation.

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