

Jim Peebles is without a doubt one of the founders of modern cosmology. As a superb physicist, he has made many fundamental contributions that define the way we do cosmology today. Remarkably, most of his insights came before the data arrived!

Cosmology tells the story of how the Universe came to look the way it does today. The Universe is a physical system that evolves: over time it expands, curves, cools, changes composition, clumps together under gravity. All this is governed by the laws of physics. Peebles, in essence, showed us how to 'do' this physics, how to describe the state of the Universe mathematically, and how to calculate statistical properties of the Universe that can be predicted from the physical description.

He applied these principles to the cosmic background radiation, the remnant radiation from the Big Bang (arguably, as one of the people who explained its significance when it was discovered by Penzias and Wilson, he would have deserved a share of their Nobel prize). He showed how tiny fluctuations in this radiation could be used to understand the composition of the Universe — several decades before such fluctuations were discovered. Only now have the beautiful results from ESA's Planck mission enabled us to fulfil the promise of this insight.

He also laid the foundation for the modern studies of the large-scale structure of the Universe, the clumpy distribution of matter and galaxies in the present-day Universe. He showed that such structures naturally grow through gravitational instability, and developed the statistical framework that is still used today to measure and describe these structures. He also showed the important role played by dark matter in structure formation. All modern cosmology missions and sky surveys aim, one way or another, to measure the statistics that Peebles brought into the field and developed.

I teach a course on large-scale structure and galaxy formation in Leiden, and it is barely an exaggeration to say that every chapter of the course can be traced back to a fundamental insight by Peebles. He truly towers over our field (in the nicest possible way). This Nobel prize is a well deserved recognition of his fundamental contributions in bringing physics to cosmology, the study of our Universe.

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