

Dark Energy and the Runaway Universe

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We expected the attractive force of gravity to slow down the rate at which the Universe is expanding. But in 1998, two essentially independent research teams made a stunning discovery: the expansion of the Universe must be speeding up with time rather than decelerating. Over the largest distances, the Universe seems to be dominated by a mysterious, repulsive “dark energy” that makes up about 70% of its contents and stretches space itself progressively faster—a “runaway Universe.” Our most recent surprise, however, is that the current expansion rate we measure is faster than that predicted from observations of the young Universe, even taking into account the known acceleration. This suggests the possibility of exciting new physics beyond the standard model of cosmology.

Biography: Alex Filippenko, an elected member of the National Academy of Sciences, is one of the world’s most highly cited astrophysicists. He was the only person to have been a member of both teams that revealed the accelerating expansion of the Universe, a discovery that was honored with the 2011 Nobel Prize in Physics to the teams’ leaders, as well as the 2015 Breakthrough Prize in Fundamental Physics to all team members. Voted the “Best Professor” on the UC Berkeley campus a record 9 times, in 2006 he was named the Case/Carnegie National Professor of the Year among doctoral institutions, and in 2022 he received the American Astronomical Society’s Education Prize. He has produced 5 astronomy video courses with The Great Courses, coauthored an award-winning astronomy textbook, and appears in more than 120 television documentaries.