The Acceleration Of The Expansion Of The Universe

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Today, the expansion of the universe can be considered a certainty. A large number of accepted facts as

1. the cosmic background radiation
2. the early nucleosynthesis of matter
3. the homogeneity, isotropy and flatness of space
4. the redshift of distant galaxies
5. the age of the oldest star clusters
6. the structure formation on large scales
7. the Olbers paradox of the darkness of the night sky

indicates its origin in an extremely dense and hot sphere of incredible small size.

Only in the most recent years a very strong argument confirmed that the size of the universe is not only expanding, it is also accelerating. This argument is based on distance estimations of supernovae Ia explosions. Accurate knowledge about distances of very far objects provide a way to calculate relative velocities of these objects. Consequently, the dynamics of the universe can be estimated for different points in time.

In my presentation I will introduce the scaling function to outline the possible futures of our universe. I will then introduce the Hubble constant and the Friedmann equations for the temporal modeling of the universe. To explain the acceleration, I will roughly outline why Supernovae Ia explosions are so useful for distant calculations and how they can deal as a cosmic distance ladder for objects with high redshift. Finally, I will give insight into the current assumed distribution of matter in the cosmos, and how this plays together with the observed acceleration.

Summary: Assuming our interpretation of the accelerated expansion of the universe is correct, and that no substantial modification in the physics of gravity will take place, the universe will extend forever and fade-out into eternity.