No Big Bang, no Strings, no Inflation

Tom Gehrels
www.lpl.arizona.edu/faculty/gehrels.html

Since I gave a recent LPL colloquium and we now have limited time, I will overview the topic only in the next paragraph (there are three papers in the above URL). This is a sales pitch for topics for research and dissertations.

Big-Bang, String, and Inflation theories have only a few, if any, supporting observations. Instead, the revised history of our universe is based on 14 sets of observations. It begins with decay in our universe and *expansion* of that into a multiverse derived from a powerful equation, which shows unified operation of quantum, relativity, gravity, and atomic physics. A cloud grows in the inter-universal medium (IUM) from the debris of sub-atomic, energy-seeking particles, which become re-energized by gravity to yield protons, photons, etc. for our universe at $t \sim 10^{-6}$ s (on the clock of Big-Bang and atomic models), *i. e.* 10^{37} Planck times later than the Big Bang, at proton density of 10^{18} kg m^{-3} (see Table).

The Schwarzschild radius provides an upper limit to a *mass and radius combination* below which radiation cannot escape, and the object may become a black hole. The arithmetic is simple because for light to escape, its kinetic energy must be greater than the local gravitational potential. For velocity of light, c, it follows that the limiting radius of the object is $R_S = 2GM/c^2$. Schwarzschild published that in 1916, but it was ignored. The Table shows the comparison of R_S with radius $R = (3M/4\pi\sigma)^{1/3}$ for a uniform sphere with density σ.

The first line is for when the universe's radiation does get to escape, for which the standard theories predict the time t = 380,000 y. So, the Schwarzschild limit works well.

The second line is for the above proton density. At first look, the Schwarzschild radius seems to prohibit the beginning of our universe at $t \sim 10^{-6}$ s. However, the size of the universe, 0.6 AU, is much larger than the sun, inside which it takes a million years for a photon to escape from its center. For the inert material, the escape might happen in 380,000 years, and $t \sim 10^{-6}$ s is alright. Radiative scattering is the *mechanism* providing radiation pressure by re-energized photons, and by dark energy (which is known to accelerate the expansion of inter-galactic space).

In the third line, the comparison is at Planck density, if our universe were ever at t = 0. The Big-Bang ideas came from thinking the expansion backwards to t = 0, *i.e.* all the mass in nearly-zero space, which is unrealistic. And this time, neither photons nor dark energy are available as yet to save the modeling. The Table shows then that the thought-experiment's reversal ought to have been halted well before that troublesome epoch. The second line does that at 10^{-6} s.

Radii and Schwarzschild Radii

R/R_S	t	σ	R(ly)
1	380,000 y	10^{-20}	10^{7}
10^{-14}	10^{-6} s	10^{18}	10^{-5}
10^{-40}	0	10^{96}	10^{-31}