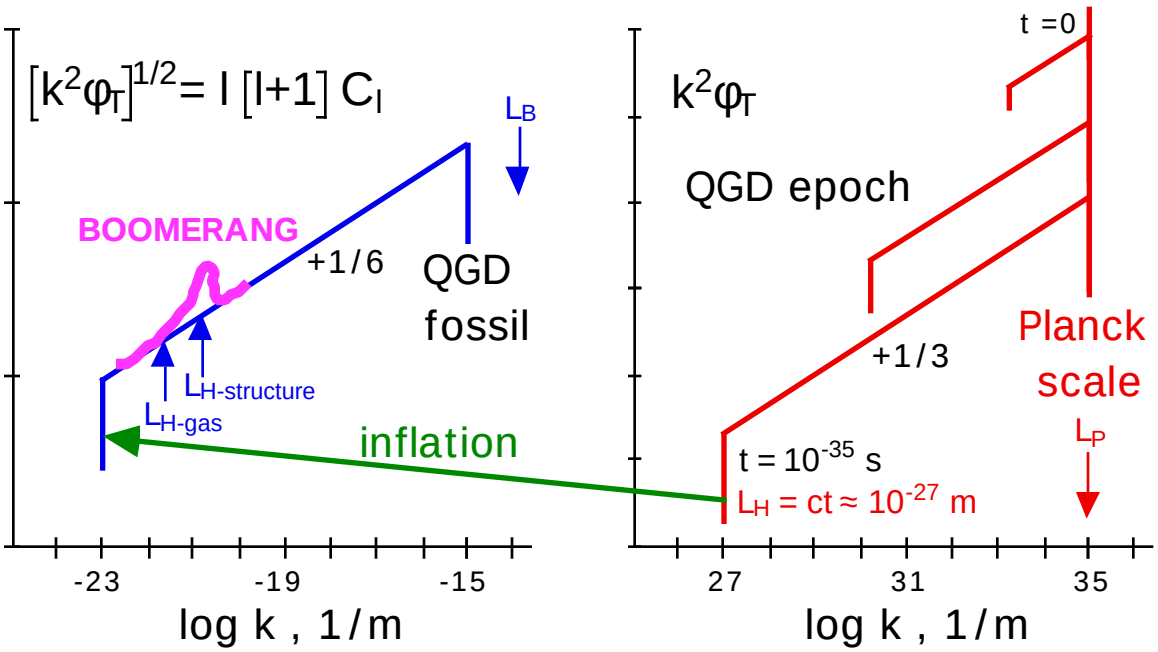
Fossil Big Bang Turbulence



Heisenberg's uncertainty principle permits space-time-energy to appear with the Planck mass $M_P = (ch/G)^{1/2}$ for up to the Planck time $t_P = (hG/c^5)^{1/2}$ with the Planck energy $E_P = (c^5h/G)^{1/2}$, Planck scale $L_P = (hG/c^3)^{1/2}$, and Planck temperature $T_P = (c^5h/Gk^2)^{1/2}$. Any longer and the process is irreversible, triggering formation of quantum-gravitational-turbulence and a Big Bang Universe. Entropy is produced by QGD analogs of viscous dissipation and diffusive dissipation at rates ε and χ, so by Corrsin-Obukhov turbulent mixing theory the temperature spectrum should be $\phi_T = \beta\chi\varepsilon^{-1/3}k^{-5/3}$ between the Planck scale and the horizon scale $L_H = ct$ as the universe expands and cools. Inflation occurs at the strong force freeze-out temperature, stretching the universe to scales out of causal contact and larger than the Batchelor diffusive cutoff scale L_B of the plasma epoch. An inflated fossil QGD temperature spectrum with a peak due to the first formation of gravitational structure are indicated by the BOOMERANG experiment, de Bernardis et al. 2000, Nature 404, 955.