

letters

state cannot itself be a "coalesced" blackhole because the Compton wavelength is larger than the gravitational radius. The bound state is the primordial proton.

I now use the old idea of John Wheeler's that a particle moving backward in time is the same as an antiparticle moving forward in time, ergo all particle-antiparticle pairs are really the same particle "zig-zagging" backward and forward in time. Thus the primordial proton can produce the 10^{77} proton-antiproton pairs currently thought to exist in the universe, corresponding to a visible matter density of 10^{-31} gm/cm³. The bulk of the matter in the universe should be in the form of 10^{-5} gm blackholes at average density 10^{-28} gm/cm³. These blackholes should be observable in cosmic-ray bubble-chamber photographs. The formation of the primordial proton was accompanied by the emission of 10^{19} GeV gravitons, which quickly convert to hadron pairs, lepton pairs and protons via f-meson mixing shortly after $t = 0$. Thus, the formation of the primordial proton also results in the fireball of the "big bang."

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Dinner-table vortices

The "dinner-table experiment" on vortex rings (January, page 55) may be improved if a small amount of detergent is added to the water. To make the vortex rings more palatable a drop of food coloring diluted with water and partially filling a drinking straw could replace the ink. To produce a vortex ring, touch the end of the straw with a partial drop on the end to the surface of the water. One might also note the effect of temperature on the speed of the vortex rings and the possibility of shooting one ring through another.

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Correction

April, page 39—Due to a printing error, eight lines in the article on Albert Michelson were duplicated and eight lines omitted. Lines 24 to 17 from the bottom of the page should read:

tion of his use of the Michelson interferometer for precise measurements, and in particular, for his determination of the length of the International Standard Meter at Paris in terms of light waves. The meter, as originally adopted, was the distance between two very fine scratches on a certain metal bar in

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