

4<sup>th</sup> International Conference on

# ASTROPHYSICS AND PARTICLE PHYSICS

December 03-05, 2018 | Chicago, USA



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### **Cosmic matter creation from viscous energy dissipation as a resurrection of Hoyle's dream**

**F**red Hoyle is known as the creator of the so-called "steady state universe" which, although permanently expanding, does not change its state of matter, especially keeping its density constant. To achieve this virtue Hoyle introduced into the energy-momentum tensor of the GRT field equations a term derived from a so-called ad-hoc creation field leading to field equations similar to the ones already developed by Tolman when introducing energy sources connected with viscous dissipation forces. In this talk, I shall again study the action of viscous forces in the cosmic baryonic matter and shall Boyle it down to volume viscosity contributions to the viscous stress tensor in a universe with a compressible Hubble flow. Assuming that by collisions of any kind the energy of the differential Hubble drift seen in the non-inertial rest frames of moving particles is randomized and converted into thermal energy, one can then show with the help of a kinetic transport equation that during the cosmic expansion permanently thermal energy is generated leading to the result that the matter temperature is linearly increasing with the scale of the universe. This not only questions the standard use of pressure-free, dust-like matter in the universe but indicates the possibility of an asymptotic cosmic-ray-like matter state including the possibility of matter creation.

### **Biography**

Hans J Fahr is Full Professor for Astrophysics at the University of Bonn in Germany, was President of Comm.21 of the IAU and received the National First Class award of Germany in 2003. At present, he is Co-I of the NASA Satellites TWINS and IBEX.

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