The End of Big Bang and the onset of a Big Bounce Universe: Whitehead’s concept of Nature extends Verlinde’s claims about Space, Time and Gravitation

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Inspired by Whitehead’s idea about nature as ensemble of events and particularly by his concept of gravitation as ‘impetus’ (Concept of Nature, 1920, edition 2007, p.181) we have the ambition to explain the local Arrow of Time of created branch systems (Reichenbach 1956, p.119-125 and Grünbaum 1973, p.210-211) in terms of Verlinde’s conception about the gravitation field in the de Sitter spacetime. Despite Einstein’s claim of a curved geometry in the neighbourhood of mass Whitehead made room for Verlinde’s concept of gravitation as emergence of an ensemble of more fundamental underlying particle interactions. Besides, in the scope of both mentioned researchers, Popper’s claims about irreversibility (Nature, CLXXVII, 1956, p.538; CLXXXI, 1958, p.402) give additional support for a complete cyclic reversible Big Bounce Universe reconciled with a local Arrow of Time.

Erik Verlinde (2009, 2011) put forward arguments for an apparent positive dark energy all based on two hypothesis. On the one hand spacetime emerges from short distance entanglement of neighbouring degrees of freedom producing a microscopic bulk perspective governed by the Bekenstein-Hawking entropy (SBh). On the other hand spacetime emerges from long range entanglement of a part of the degrees of freedom producing the de Sitter spacetime evenly divided over the same microscopic degrees of freedom producing gravity entropy (Sm). Moreover he introduced elements of condensed matter physics putting forward gravitation as the elastic relaxation reaction of Higg’s branch of the early universe on the creation of the escaping Coulomb branch. The dynamics of this gravitation mass creating process is the competition of delocalized thermalized excitations with the free quantum states. Whitehead’s conceptions, however, go a step further than Verlinde’s claims that gravitation is an essential reactive consequence of spacetime to the escape of mass by excitation from the groundstate by competition between short and long range entanglements of the energy-momentum tensor. Indeed, Whitehead’s conceptions imply tacitly creation of appropriate gravitational environment by mass excitation escape to settle down energy and momentum in web of space and time-like events. Natural events are measurable if these events imply duration. However, beyond the baryonic mass escape physical theories can start from dimensionless points of space or instants of time in even more than four dimensions as most string theories do, however, these instants are just the ideal of the non-entity (2007, p.61). Consequently instants such as the absolute beginning of Big Bang and even the branch off of parts of the Universe such as galaxies become rather disputable as the real of a non-entity. In consequence time and space appear just after baryon mass escape. This means that there is no time and space of real events before the creation of Sm.

Furthermore, Whitehead’s concept of nature Verlinde shows also the path to make room for understanding paradoxes such as the apparent incompatibility between time symmetric...
micro-interactions and the asymmetric time appearing in galaxies and solar systems. The latter corresponds with the branch off’s firstly mentioned by Reichenbach (1956, p. 113-143) and afterwards by Grünbaum (1973, pp 257 -259).

Besides Whitehead’s conception of matter, space and time doesn’t imply a unique ‘space-timeless energy-momentum entity’ nor an absolute beginning of the universe. It has, however, a very remarkable logic corollary: it doesn’t exclude speculations about partial entanglements of short range as well as long range entanglements within the pre-space-time energy-momentum entity evolving to minimum free energy.

In addition the ‘space-timeless entity’ is not an infinite source of baryonic mass creation. Corruptive entropy appears in the dissipating and expanding universe. Obviously dissipation increases by overwhelming mass production, the memory effects of the original baryon creation is disappearing and space-time is shrinking into a space-timeless cold sink. In addition also entropy as extensive physical parameter declines so that temperature is raising in the sink. It looks like the periodic motion of a giant Carnot engine where heat source and sink or alternatively sharing there function in order to produce the eternal periodic dynamics of the Universe. The universe didn’t start from the Big Bang but oscillates eternally just like the Big Bounce Universe. Finally, according to Popper’s claims (Nature, CLXXVII, 1956, p. 538; CLXXVIII, 1956, p.382; CLXXIX, 1957, p.1297; CLXXXI, 1958, p.402) the singularity of the Big Bang evolving from a central source sounds rather odd. The Giant Carnot Universe, however, makes room for the alternative oscillating Big Bounce Universe.