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Theorie-Palaver

Feb. 6, 2024 at 2 p.m.

Lorentz room (Staudingerweg 7, 5th floor)

Filippo Sala
U. Bologna

Bubbletrons

I will show how first order phase transitions (PT) in the early universe, with relativistic bubble walls, constitute particle accelerators and colliders via the dense shell of particles that they necessarily accumulate. These 'bubbletrons' offer novel opportunities of observational access to very high energy scales, in addition to the gravitational waves from the PT. As three examples, I will discuss: i) non-adiabatic production of ZeV dark matter which is hot enough to leave an imprint in the matter power spectrum; ii) production of relics beyond the GUT scale without the need for the universe to ever reach those temperatures; iii) realization of testable baryogenesis and leptogenesis down to the TeV scale. In passing I will mention open questions about the physics of particle shells at bubble walls, and their potential far-reaching implications.

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