Topological matter: Weyl fermions, Higgs bosons, quantum gravity and room-T superconductivity

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A-phase and polar phase of superfluid ^{3}He – gapless topological superfluids with Weyl fermions and Dirac nodal lines – have synthetic gauge fields and gravity, exotic topological defects, such as Alice strings, and Higgs modes. We discuss here some topics of the recent experimental and theoretical studies of these superfluids. This includes the Lifshitz transitions to antispacetime[1] and to type-II Weyl fermions behind the black hole horizon,[2] transition to Euclidean metric,[3] interplay of real-space and momentum-space topologies in fermionic glasses,[4] the flat band route to room temperature superconductivity,[5] etc.

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