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Compressible quantum phases from conformal field theories in 2+1 dimensions SUBIR SACHDEV, Harvard University — Conformal field theories (CFTs) with a globally conserved U(1) charge Q can be deformed into compressible phases by modifying their Hamiltonian, H, by a chemical potential $H \to H - \mu Q$. We study 2+1 dimensional CFTs upon which an explicit S duality mapping can be performed. We find that this construction leads naturally to compressible phases which are superfluids, solids, or non-Fermi liquids which are more appropriately called 'Bose metals' in the present context. The Bose metal preserves all symmetries and has Fermi surfaces of gauge-charged fermions, even in cases where the parent CFT can be expressed solely by bosonic degrees of freedom. Monopole operators are identified as order parameters of the solid, and the product of their magnetic charge and Q determines the area of the unit cell. We discuss implications for holographic theories on asymptotically AdS_4 spacetimes: S duality and monopole/dyon fields play important roles in this connection.

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