Composite dark matter hides stable heavy charged particles in neutral atom-like states. Physical examples of such stable particles are given. In the early Universe formation of composite dark matter is accompanied by formation of various fractions of exotic matter, which are severely constrained by observations. Observational consequences of various composite dark matter models (in particular, an interesting realization of warm dark matter scenario) as well as the possibilities of direct search of its charged constituents in cosmic rays and at accelerators are discussed.