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Thermodynamical properties of a neutral vector boson gas in a constant magnetic field

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We study the thermodynamical properties of a neutral vector boson gas in a constant magnetic field starting from the spectrum obtained by Proca formalism.
Bose Einstein Condensation (BEC) and magnetization are obtained, for the three and one dimensional cases, in the limit of low temperatures. In three dimensions the gas undergoes a phase transition to a usual BEC in which the critical temperature depends on the magnetic field. Therefore, the condensation is reached not only decreasing the temperature, but also by increasing the field. For the one dimensional gas a diffuse BEC appears. In both, one and three dimensions, the magnetization is a positive quantity and for densities under a critical value the gas can sustain its own magnetic field.
The anisotropic pressures are also considered. The pressure exerted along the field is always positive, but the perpendicular pressure might be negative and the system turns out to be susceptible to suffer, under certain conditions, a transversal magnetic collapse.
The above describe phenomenology is manifested for magnetic fields and densities in the order of those typical of compacts objects. In this regard, a brief discussion of astrophysical implications is presented.

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