**General Relativity and Quantum Cosmology**

# Effects of the Electromagnetic Field on Five-dimensional Gravitational Collapse

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This paper investigates the five-dimensional(5D) spherically symmetric gravitational collapse with positive cosmological constant in the presence of an electromagnetic field. The junction conditions between the 5D non-static interior and the static exterior spacetimes are derived using the Israel criteria modified by Santos. We use the energy conditions to discuss solution to the field equations of the interior spacetime with a charged perfect fluid for the marginally bound and the non-marginally bound cases. We found that the range of apparent horizon was larger than that for 4D gravitational collapse with an electromagnetic field. This analysis gives the irreducible and the reducible extensions of 4D perfect fluid collapse with an electromagnetic field and 5D perfect fluid collapse, respectively. Moreover, for the later case, the results can be recovered under some restrictions.

## Submission history

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