

Abstract Submitted
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Phase transitions: from liquid-vapor to black holes – a unified picture SUJOY MODAK¹, S.N. Bose National Centre for Basic Sciences — Conventional thermodynamics identify liquid to vapor phase transitions as a first order transition. Starting from the definition of the Gibbs free energy one obtains Clausius-Clapeyron equation which is satisfied for such a first order phase transition. Similarly for a second order phase transition Ehrenfest relations are satisfied. In this talk we implement these elementary ideas in black holes defined in anti-deSitter space. For charged as well as rotating black holes we show that there exists a phase transition from lower to higher mass (horizon-radius) branch which is not first order. We then derive and check the validity of Ehrenfest relations for these black holes. Our analysis proves that this is a second order phase transition. This result is also verified by using an alternative thermodynamic-state-space geometry approach.

¹I would be a visiting researcher at California State University, Fresno, at the time of attending the meeting.

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