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Thesis Title	<i>Stability of Higgs Field and Black Holes at Early Universe</i>
Supervisor	N. Tetradis, Professor
Summary	<p>If the potential of a theory has more than one vacuum (local minimum), then it is possible due to quantum tunneling (quantum vacuum decay) and/or thermal jumps (thermal vacuum decay), to have transitions between the vacua. The transition happens through a first order phase transition induced by the nucleation of a bubble of the new vacuum, within the space of the old vacuum. The bubble expands until it fills all the space. In the presence of gravity this phenomenon gets more complicated and at the same time more interesting. Within this MSc thesis we study the effect of primordial black holes on the thermal decay of the standard electroweak vacuum at high temperature. Specifically, we find the exponential suppression of the nucleation rate, which can be reduced significantly, or even eliminated completely, in the black hole background if the Higgs field is coupled to gravity through the renormalizable term $\xi R h^2$.</p>
Key words	Vacuum Decay, Higgs Field, Black Holes
Evaluation committee	N. Tetradis, Professor K. Sfetsos, Professor T. Christodoulakis, Associate Professor