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Letter of Motivation

I am writing to express my utmost interest towards the PhD position at the IFAE in Barcelona. The prospect of continuing to work in high energy physics and cosmology, is something I find tremendously exciting. In what follows, I hope to explain my motivations for pursuing the PhD position at IFAE.

Background: I have always been very interested in high energy theoretical physics, and ideas of QFT and cosmology especially so. Because I have maintained these interest throughout my time in university, I have been able to select courses which I believe better qualify me for a PhD position in theoretical high energy physics. These courses include, but are not limited to: *Quantum Field Theory, Elementary Particle Physics, Particle Physics & the Early Universe, General Relativity & Cosmology* and *Gauge / Gravity Dualities*.

Master thesis: My master thesis work was focused on computing several types of two-point functions in different defect versions of $\mathcal{N} = 4$ *super Yang Mills theory*. These defect setups all completely break super symmetry, and simultaneously possess relatively simple string theory duals. The hope is that these two-point functions could be tested against two-point functions in the dual string theory and in this way provide a novel, non-trivial test of AdS / dCFT.

Bachelor thesis: My bachelor thesis work was done in cooperation with my good friend *Christian Schiøtt*. The aim of our work was to study the thermal nature of the three dimensional *BTZ black hole*. Despite the fact that three dimensional Einstein gravity is purely topological (*no propagating degrees of freedom*) the BTZ black hole possesses a non-zero temperature, which was found by examining properties of scalar-field propagators on the BTZ background.

In summary, I have experience working in high energy physics; *AdS / CFT* and *three dimensional gravity* in particular. My hope for the future is to find an opportunity to continue my studies of high energy physics; preferably both particle physics, gravitational physics and their intersections. All this leads me to believe that I would be a great fit for the PhD position at IFAE in Barcelona.

Sincerely,
Rasmus S.K. Nielsen

SEP 15, 2021

Theoretical Particle Physics
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