UNIVERSITY OF COPENHAGEN
NIELS BOHR INSTITUTE

University of Murcia,
The FISPAC research group,
C. Campus Universitario, 11, 30100 Murcia

Letter of Motivation

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Theoretical Particle Physics and Cosmology

BLEGDAMSVEJ 19
DK-2100 COPENHAGEN Ø
DENMARK

TEL +45 24 66 45 01
jbz701@alumni.ku.dk
Github-page

I am writing to express my utmost interest towards the PhD position at the FISPAC research group, University of Murcia. The prospect of continuing work in the fields of string theory and holography, is something I find tremendously exciting. In what follows, I hope to explain my motivations for pursuing the PhD position at the FISPAC research group.

Background: I have always been very interested in high energy theoretical physics, and ideas of quantum gravity especially so. Because I have maintained these interest throughout my time in univeristy, 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: *Group Theory*, *Quantum Field Theory*, *String Theory*, *Advanced Quantum Mechanics*, *General Relativity and 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 ideas pertaining to string theory and holography. All this leads me to belive that I would be a great fit for the PhD position at the FISPAC research group, Murcia U.

Sincerely,
Rasmus S.K. Nielsen