UNIVERSITY OF COPENHAGEN
NIELS BOHR INSTITUTE

University of Bielefeld,
The Faculty of Physics,
Universittsstraße 25, 33615 Bielefeld

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 Faculty of Physics, University of Bielefeld. The prospect of exploring topological features of QCD using *Lattice Gauge Theory* simulations, is something I find tremendously exciting. In what follows, I hope to explain my motivations for pursuing the PhD position at The Faculty of Physics, Bielefeld U.

Background: I have always been very interested in high energy theoretical physics, and the idea of using simulations as an investigative tool. 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*, *Elementary Particle Physics*, *Advanced Quantum Mechanics*, *Numerical Analysis* 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.

Programming experience: In addition to my interest in high energy physics and holography, I have also been very interested in programming and computer sience from an early age. This has led me to develop simulations of different physical systems; for example a simulation of the classical double pendulum system using 4th order *Runge-Kutta integration*.
I have extensive programming experience with: **MATLAB** and **Python** and moderate programming experience with: **C++**, **C** and **Java**.

In summary, I have experience working in high energy physics; *AdS / CFT* in particular. I also have experience with the programming languages: *Python*, *C* and *C++*. My hope for the future is to find an opportunity to continue my studies of high energy physics; preferably ideas pertaining to quantum field theory or gravitational physics. All this leads me to belive that I would be a great fit for the PhD position at The Faculty of Physics, University of Bielefeld

Sincerely,
Rasmus S.K. Nielsen