

**Reference to Graduate School of Science and Technology in connection with a PhD study application**

The reference concerns the following applicant:

Name: Kristian Knakkegaard Nielsen

The reference is made by:

Name: Georg Morten Bruun

Affiliation: Institut for Fysik & Astronomi

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How long have you known the applicant?

I first met Kristian when he participated in my undergraduate course Statistical Physics in 2014. Since then, he has been a student in two other courses of mine: Solid State Physics II and Quantum Physics with Cold Atoms and Ions. He presently participates actively in a study group of mine concerning the topological phases of quantum matter. Moreover, he is doing his Master Thesis with me as the advisor.

Please place the applicant in the table below, compared to his or her fellow students at the same level of education.

Among the best	50%	25%	10%	5%	Do not know
Professional qualifications				x	
Maturity				x	
Creativity				x	
Motivation				x	
Intellectual potential				x	

Please give a brief evaluation of the applicant

I rank Kristian in the top 3 of all the students I have known fairly closely at Aarhus University. He is an excellent student. His Master thesis concerns the topological states of a 1D wire surrounded by a Bose-Einstein condensate. This is a pretty high level theoretical topic for a Master thesis involving Feynman diagrams for induced interactions, the theory of Cooper pairs and superfluidity, and abstract concepts related to topological phases. Not only did Kristian quickly learn the necessary tools to perform research in these topics, but he has presently gone beyond the level of my knowledge concerning the theory of topological phases. This is particularly impressive since there is no useful textbook on this new topic. As a person, Kristian is very easy to work with, and he reliably produces accurate results with no errors. I give him my strongest recommendations as a PhD student.

*Georg M. Bruun*