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Title

Hanul

Dear Professor Gabriel T. Landi

1.5 I am writing to briefly introduce myself as a prospective Ph.D. student in your laboratory. I hope my story will help you evaluate my potential as a candidate.

I first encountered the concept of quantum information when I was a child. Back then, I enjoyed reading several physics books, and one of them introduced me to the idea of information as a physical concept, which attracted me strongly.

I've graduated in physics at the Catholic University of Korea, a small yet delightful place. Since most professors majored in statistical physics, I've got a thorough basis of statistical mechanics and related theoretical frameworks, where I achieved a high score.

During my undergraduate studies, I became aware of the research field of quantum optics. I came across a paper and a book that discussed the concept of coherence and the general properties of photons. Although I recognized the various research areas within quantum optics, I was still uncertain about my specific research direction.

I am currently conducting research at the Daegu Gyeongbuk Institute of Science and Technology (DGIST) as a master's degree candidate. I met my current PI by chance and became involved in research related to open quantum systems. Through this research and an information theory course that I took during the first semester of my second year of graduate school, I was able to clarify my research interests.

My master's thesis is related to the Schmid quantum dissipative phase transition. In brief, I treated the resistively shunted Josephson junction as a physical simulator for the phase transition and mapped it onto a many-body problem, observing some remarkable results. To evaluate its dynamics in thermal dependency, I utilized a diagrammatic expansion method, which expands the system's dynamics perturbatively within the grand canonical ensemble framework. This method maps each term from the partition function as a series expansion onto featured topological structures, allowing for the exact calculation of all terms.

Focused on quantum optics and information for a long time, I am particularly interested in how systems lose their energy, or rather, information, through interaction with the environment over time. My expectation is to apply the methodology I learned during my master's degree to stochastic approaches and adapt it to open quantum systems. 15cm]This is a margin note for the introduction section. It should now be more to the left and not cut off.