

IOWA STATE UNIVERSITY

Department of Physics and Astronomy

Professor James P. Vary

Zaffarano Hall 515
Ames, Iowa 50011-3160
Phone 515 294-8894
FAX 515 294-6027
email JVARY@IASTATE.EDU

April 29, 2023

Organizers
Quantum Computing Boot Camp

Re: Dr. Weijie Du

Dear Selection Committee Members:

I am writing to enthusiastically support the application of Weijie Du for admission to the 2023 Quantum Computing Boot Camp. Weijie graduated with his PhD in 2019 having worked with me for four years. After completing a joint postdoctoral position between Iowa State University and the Institute of Modern Physics, Lanzhou, China, he returned to our group as a postdoc in 2021. During his graduate and postdoc careers, Weijie and I have collaborated together on six published journal papers and two more submitted for publication (one to Phys. Rev C and one to Phys. Rev. A). Weijie is, appropriately, the lead author on six of these eight papers. Throughout my nearly eight years of working closely with Weijie, I have developed a deep appreciation for his physics knowledge and insight as well as his analytic and technical skills.

Weijie has successfully investigated diverse problems: (1) renormalization in ab initio nuclear structure theory (Okubo-Lee-Suzuki approach) with applications to both the nuclear interaction and to the consistent treatment of electroweak operators in nuclei; (2) developing and applying a time-dependent basis function (tBF) approach to scattering in non-perturbative time-dependent fields (e.g. from heavy ion scattering) as a probe of nuclear structure; (3) calculating baryon structure in a relativistic meson-nucleon Lagrangian solved in Hamiltonian light-front field theory; (4) radiative capture of neutrons on protons in the region of astrophysical interest using chiral effective field theory; and (5) applications of quantum computers to solve forefront non-perturbative problems in nuclear structure and nuclear reactions. His work features both analytic and numerical efforts and he is performing exceptionally well on all fronts.

Recently, he has invested his efforts substantially in this last area of quantum computing applications to nuclear physics. His initial paper on “Quantum simulation of nuclear inelastic scattering” (W. Du, et al., Phys. Rev. A 104 (2021) has already achieved 23 citations according to INSPIRE). His most recent work, posted within the last two weeks, on

“Multi-nucleon structure and dynamics via quantum computing” (W. Du and J.P. Vary, arXiv 2304.04838) establishes a major starting point for a longer term project to develop a quantum computing approach to the *ab initio* No-Core Shell Model (NCSM). Given his growing focus on the applications of quantum computing to nuclear physics, I firmly believe that Weijie will greatly benefit from, as well as contribute to, the Quantum Computing Boot Camp.

Weijie is a true delight to work with. He has very good physical insight, works hard in all phases of the project, carefully checks all details of his results, studies the relevant literature, is very forthright with research issues that he has concerns about, writes exceptionally well and self-generates new ideas and lines of research. Weijie works very well with others and helps our younger students with generous offers of his time. In short, Weijie is quickly advancing and will be very competitive in the job market for faculty positions. I am pleased to provide my enthusiastic recommendation in support of Weijie Du for admission to the Quantum Computing Boot Camp.

Yours Sincerely,

A handwritten signature in cursive script that reads "James P. Vary". The signature is written in black ink and is positioned below the text "Yours Sincerely,".

James P. Vary
Professor of Physics