Jason Lee

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EDUCATION BACKGROUND

School of Science, Zhejiang University of Technology Hangzhou, CN
Bachelor's Degree of Science 2019.09-2024.06
Major in Optoelectronic Information Science and Engineering
Minor in Information and Computational Science
General GPA: 87.43 / 100 (Ranking: 1/ 60)

University of California, Berkeley(Exchange) California, USA
The Berkeley Physics International Education (BPIE) Program 2024.01-2024.06

The University of Electro-Communications(Exchange) Tokyo, Japan
Japanese University Studies in Science & Technology 2022.10-2023.09

Relevant Courses:
Quantum Mechanics (94/100), Mathematical Methods in Physics (90/100), Analytical Mechanics (92/100), Statistical Physics (98/100).

Research Interests: Bose-Einstein Condensation | Cold Atom | Atom Interferometer

HONORS AND AWARDS

- Provincial Government Scholarship 2022.09
- The First Prize Scholarship 2022.09
- School Outstanding Students Scholarship 2022.09

RESEARCH EXPERIENCE

Formation of two-dimensional quantum droplets *2022.10-2023.09*

Research Advisor: Professor Hiroki SAITO

Summary: Explored the stability of 2D quantum droplets in ultracold gases focuses on the critical balance between dipole and contact interactions. Solved the extended Gross-Pitaevskii equation (eGPE) using the pseudospectral method accurately determines the ground state of these droplets. This approach offers spectral accuracy, proving ideal for uncovering the droplets' density and stability. Achieving such equilibrium is pivotal in preserving the droplets' distinct liquid-like quantum state within a two-dimensional framework.

- Introduced eGPE to describe quantum droplets, incorporating both dipole-dipole and contact interaction effects.
- Used the pseudospectral method for the numerical solution of the eGPE, chosen for its efficiency and accuracy.
- Applied the Fourier transform to the wave function from physical to momentum space (k-space) to simplify the eGPE's dipole-dipole interactions. This makes the system's time evolution computationally efficient by converting differential to algebraic equations.
- Used imaginary time evolution, replacing real time with imaginary time, to exponentially dampen higher energy states, guiding the system to its ground state. This method is key for finding the stable, lowest energy configuration of the quantum droplet as described by the eGPE.

Measurement of gravitational acceleration based on cold atom interference *2022.07-2022.09*

Research Advisor: Professor Qiang Lin

Summary: The complexity of high-precision gravity measurements is explored using cold atom interferometry. Using laser cooling technology, rubidium-87 atoms are cooled to sub-microkelvin temperatures to minimize the effects of thermal motion. By precisely controlling the frequency and phase of the laser, the atomic wave packet is split into two coherent paths during free fall. These paths generate a phase difference under the influence of gravity, and when they recombine, the analysis of the interference pattern allows for an accurate measurement of gravitational acceleration.

- Utilized an existing cold atom generator to produce rubidium-87 cold atoms at a temperature of 10 microkelvin, initiating their free fall from a stationary state.
- Implemented a sequence of Raman laser pulses at regular intervals T, leading to the generation of interference patterns due to the phase difference between atoms on two different paths.
- Measured the probability of atomic transition to an excited state after interference, which correlates with gravitational acceleration. Modified the scanning slope of the Raman laser to fit the transition probabilities with a sine function, extracting interference fringes and acceleration values.
- Corrected the vertical alignment of the Raman laser using the reflection of water, reducing the uncertainty in measurements.
- Processed the experimental data locally, recording the scanning slope and corresponding state transition probabilities, fitting the data using a sine function in Origin software.

Motor Imagery Control of An Electroencephalic Robotic Arm *2021.07-2022.06*

Research Advisor: Associate Professor Dezhao LI

Summary: Investigated the problem of how to control the simple movement of the robot arm by human imagination, and extract the features of the collected EEG signals. Created a set of algorithms to extract the features from EEG signals by using neural network, and transmitted the features to the host computer to control the movement of the robotic arm.

- Utilized a non-invasive EEG headset to do experiments for collecting EEG signals.
- Independently completed the programming of manipulator control on QT platform.
- Designed software code for the extraction of features in the collected EEG signals, adopting neural network.

Others

- Programming Language: Python, C/C++, R, MATLAB
- Language: Mandarin(native), English, Japanese