

Project Title:**SIMION Simulation for MR-TOF Development****Name:**

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1. Background and purpose of the project, relationship of the project with other projects

This project aims to find the optimized electrode potential for the MRTOF system using the parallel execution of SIMION program based on HOKUSAI supercomputer.

The electrode potentials of the MRTOF system is critical to push the world-record mass resolving power to another extend. By using simulation software in parallel scale and analyzing the response of the resolving power from different potential input, we can have a better understanding of the system and searching for the optimal potential setting in a more efficient way.

Due to the SIMION program is single threaded and takes significant amount of memory, it will be inefficient to run on ordinary server. Additionally, it requires find the minimum point in about 15-dimensional space. Therefore, utilizing the large memory pool and scalability of HOKUSAI system is an ideal way to perform such kind of research.

2. Specific usage status of the system and calculation method

The SIMION program is a Monte Carlo simulation program which simulates charged projectile flying through electric field.

It will first require inputting the geometry and voltage of the electrode to solve the electric field using finite element analyzing method based on solving the Poisson equation. Then the charged particle will be released, and the trajectory will be determined by stepping through the electric field internally in the SIMION program. The distribution

of the projectile at the end of simulation will be analyzed to reflect the resolving power.

By parallely running SIMION program with potential input chosen by iterative minimum finding algorithm, the optimized potential can be found and, therefore, will be tested in physical MRTOF system.

3. Result

N/A

4. Conclusion

N/A

5. Schedule and prospect for the future

This project is unlikely to be continued in the future due to the reason stated below.

6. If no job was executed, specify the reason.

Unfortunately, due to the unexpected increase of workload of other projects. This project does not have sufficient manpower to execute therefore no jobs were submitted.

Usage Report for Fiscal Year 2022

Fiscal Year 2022 List of Publications Resulting from the Use of the supercomputer

[Paper accepted by a journal]

N/A

[Conference Proceedings]

N/A

[Oral presentation]

N/A

[Poster presentation]

N/A

[Others (Book, Press release, etc.)]

N/A