**THESIS INFORMATION**

Thesis title: The nuclear mean-field potential for 12C+12C and 16O+16O fusions at low energy region

Speciality: Atomic Physics

Code: 62440106

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**1. SUMMARY**:

A mean-field description of 12C+12C and 16O+16O fusions at low energy region have been performed based on the folding model. In the folding calculation, the nuclear potential was constructed using the density-dependent (effective) nucleon-nucleon interaction, named CDM3Y3. The validity of nuclear potential was carefully tested using the optical model analyses of elastic 12C+12C and 16O+16O scattering data at low energies. After that, the appropriate potential was applied into the barrier penetration model to estimate the fusion cross sections and astrophysical S factors of 12C+12C and 16O+16O systems at energies below the Coulomb barrier.

**2. NOVELTY OF THESIS**:

+ In the folding calculation, the density-dependent nucleon-nucleon CDM3Y3 interaction was used instead of the density-independent nucleon-nucleon interactions.

+ Suggest the ADA approximation that provides a better description for overlap density than FDA approximation at low energies.

+ The VHF+VRT(ADA) potential gives a consistent description for both the elastic and fusion cross section of 12C+12C and 16O+16O systems at low energies.

+ The nuclear repulsive-core potential VM3Y+Rep could not be appropriate to describe the nuclear 12C+12C and 16O+16O interactions at low energy region.

**3**. **APPLICATIONS/ APPLICABILITY/ PERSPECTIVE**

+ The VHF+VRT(ADA) potential will be used to study the 12C+13C, 16O+17O and 16O+12C fusions at low energies.

+ The coupled channel calculations will be performed to including the coupling effects to 12C+12C and 16O+16O fusions.

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| **SUPERVISOR** | **PhD STUDENT** |

**CONFIRMATION**

**UNIVERSITY OF SCIENCE**

**VICE PRESIDENT**