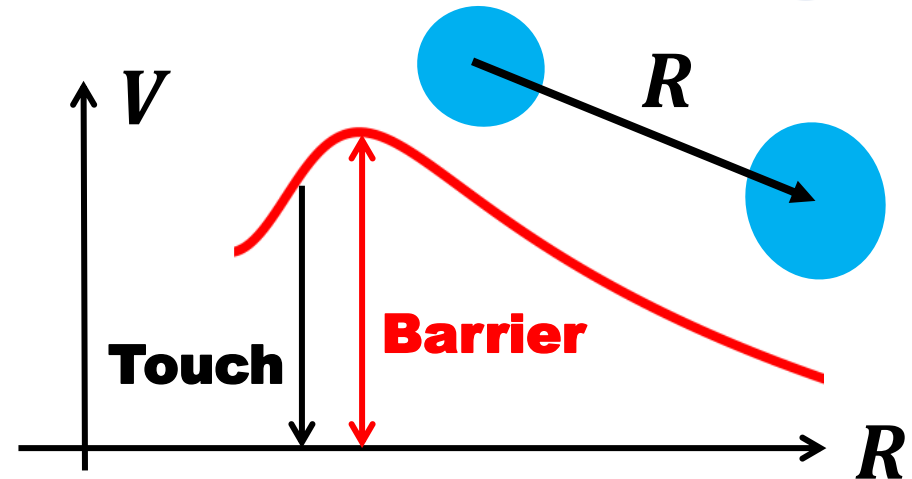


RESEARCH PROJECT

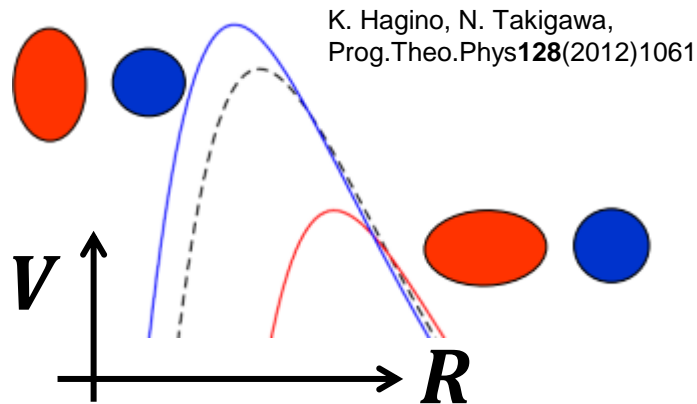
Fusion reactions

- ✓ Potential = Coulomb + Nuclear
- ✓ Touch and fusion
- ✓ Barrier transmission problem (with nuclear structure)



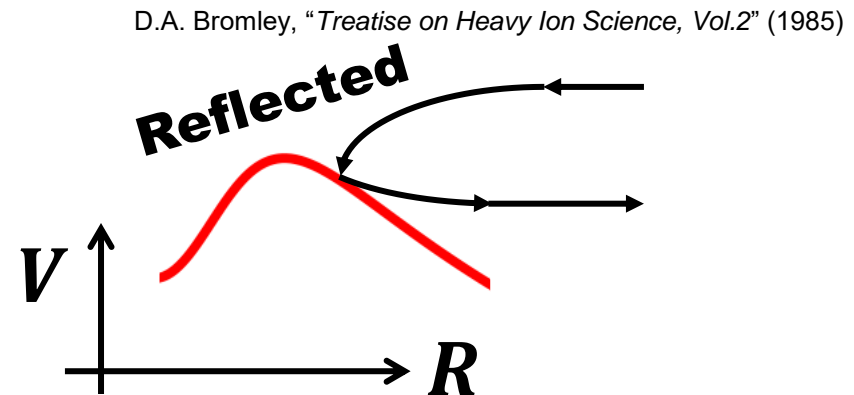
Research Goal

Below the Barrier



**Collective motion
(Quantum)**

Above the Barrier



**Energy dissipation
(Classical)**



Unified Description

RESEARCH PLAN

DONE
THIS OR NEXT TERM



● How to Unify

U. Weiss, "Quantum Dissipative Systems" (2012)

Quantum mechanical description of energy dissipation
Methods for open quantum systems (Influence functional)

R.P. Feynman F.L. Vernon, Ann. Phys. 24 (1963) 118, A.B. Balantekin N. Takigawa, Ann. Phys. NY 160 (1985) 441

● How to Solve

France (D1)

M. Tokieda and K. Hagino, Ann Phys, 412 168005 (2020)

● Microscopic Transport Coefficients

M. Tokieda and K. Hagino, Front. Phys., 8 (2020) France (D1)

Methods for fission dynamics Prof. F. Ivanyuk (D2)

Shell model calculation of nuclear structure Italy (M2)

● Barrier Penetration with Dissipation

Comparison with classical method Prof. J. Randrup (D2)
Prof. F. Ivanyuk (D2)

More discussions on dissipation, memory, decoherence

INTERNATIONAL TRAINING

Total: 43 days (as of 20.05.25)

Cancelled

Kiev, Ukraine (20.04.mid – 20.05.mid)

Discussions with Prof. Fedir Ivanyuk

Beijing, China (20.05.23 – 20.06.01)

Discussions with Dr. Zhuxia Li and Dr. Li-Le Liu

Plans

Reaction Seminar (20.04 – 20.06 (Tue, Thu))

Wide range of nuclear reactions

Shizuoka, Fusion20 (20.11.15 – 20.11.20)

International conference on heavy-ion collisions

Other online seminars ...