

Multiscale Analysis, Modeling and Simulation
-Top Global University Project, Waseda University
Report on Study Abroad
Name: Takayuki SUZUKI

Date: 2022/9/5

1. Destination: Palermo University, Palermo, Italy
2. Dates of stay: Jun 14, 2022 – August 1, 2022 (49 days)
3. Purpose: Discussion of problems related to nonadiabatic processes in time-dependent quantum systems
4. Host Professor: Antonino Messina (Palermo University)
5. Research Activity:

I am studying nonadiabatic processes of quantum systems under time-dependent Hamiltonians. In general, the Schrödinger equation for the time-dependent Hamiltonian is not solvable. Therefore, I aim to analyze the dynamics of complex models by deriving exact or approximate solutions for various simpler models. The problem I was working on during my trip was the approximate derivation of transition probabilities for a finite-dimensional, quadratically time-dependent Hamiltonian. During the trip, we discussed the validity of the derivation of the approximate solution and the meaning of the approximate solution. We also discussed how this problem setup could be viewed from the viewpoint of dynamical localization.

6. Other comments

I have not been able to go on overseas trips because of Covid-19, and this was my first overseas trip as a Ph.D. student. I would like to thank everyone who supported this valuable opportunity. I thank Prof. Nakazato and Prof. Messina for introducing me to local accommodations, stores, and restaurants. The discussions with Dr. Grimaudo were very meaningful. I would like to cherish this relationship with them in the future. I would also like to thank Ms. Ishizaki at SGU at Waseda University for her assistance in various procedures.



The Town of Palermo



With Prof. Antonino Messina at the University of Palermo, Italy