

1	Title of research		Structure of neutron-rich hydrogen nucleus ( ${}^7\text{H}$ ) and neutron-rich He ( ${}^8\text{He}$ ) nucleus
2	List of Participants (Name and affiliation)		Emiko Hiyama, Tohoku University, Kazuyuki Ogata, Osaka University,
			Kazuki Yoshida, JAEA, Jaume Carbonell, Orsely, Rimantas Lazauskas, Strasbourg
3	Period of research		From June 12, 2020 to Mar. 31st, 2022
4	Main location of collaboration implementation		Online (Due to pandemic of COVID-19)
5	Publication list (Please include DOI if available)	Articles	
		Talks	Emiko Hiyama, March 15, 2021, Symposium in JPS meeting, "Hierarchical structure from view point of few-body problem"
		Theses	
6	Description of the results and outputs		In 2020, I focused on making code to calculate the resonant state of ${}^7\text{H}$ within the framework of $t+4n$ five-body model. The key is $t$ - $n$ potential to reproduce the $t$ - $n$ scattering data. Lazauskas provided $t$ - $n$ potential with pure Gaussian-form. The potential reproduces the scattering $t$ - $n$ data. However, the potential does not reproduce the observed resonance of ${}^5\text{H}$ . Then, we introduced a phenomenological $t$ - $n$ three-body force and tuned the strength of three-body force so as to reproduce the data of ${}^5\text{H}$ . The three-body force is applied to the calculation of ${}^7\text{H}$ . Currently, without three-body force, we found the resonant state, $1/2^+$ , by about 15 MeV above $t$ - $4n$ threshold. In the next financial year, with three-body force to reproduce the observed resonance, we obtain resonance of ${}^7\text{H}$ . In addition, we will make a code of ${}^8\text{He}$ ( $\alpha+4n$ model) and calculate energy spectra of this nucleus.