Report of the RCNP Collaboration Research Network (RCNP-COREnet)

COREnet028 PI: MURAMATSU Norihito

1	Title of research		Studies for the future facilities to produce an extremely high energy and polarized photon beam via coherent bremsstrahlung radiation
2	List of Participants (Name and affiliation)		Norihito Muramatsu (ELPH, Tohoku University)
			Tomoaki Hotta (RCNP, Osaka University)
			Kenneth Livingston (University of Glasgow)
3	Period of research		June, 2020 - March, 2022
4	Main location of collaboration implementation		RCNP, Osaka University
5	Publication list (Please include DOI if available)	Articles	
		Talks	"Tests of coherent bremsstrahlung radiation techniques to produce a high energy gamma-ray beam with linear polarization", N. Muramatsu, ATF Mini-workshop (online slide presentation), 28 Aug 2020.
		Theses	
6	Description of the results and outputs		In order to advance the photoproduction research of heavy exotic hadrons including charm and bottom quarks, we conducted technical studies on a method for generating a polarized photon beam with several tens of GeV by coherent bremsstrahlung radiation using an ultra-high energy electron accelerator. Simulations were carried out by assuming the use of ILC which will provide electron and positron beams of 125 GeV, and it was confirmed that a sufficient photon beam intensity will be obtained if an electron or positron beam with an angular divergence suppressed to about 1 urad is passed through a 50 um-thick diamond crystal. Linear polarization will reach about 70% for a photon beam energy of 75 GeV. In order to pave the way for technological development of a diamond radiator, a gonio-meter, a polarimeter, etc., we also examined a future test experiment at the KEK ATF-2 facility.