

**Name:** Hiroyuki Osaka, osaka@se.ritsumei.ac.jp

**Affiliation:** Department of Mathematical Sciences, Ritsumeikan University

**Title:** Positive linear maps on matrix algebras and applications

**Abstract:**

Let  $\mathcal{A}$  and  $\mathcal{B}$  be  $C^*$ -algebras and  $\phi: \mathcal{A} \rightarrow \mathcal{B}$  be a linear map. We say  $\phi$  is positive if  $\phi(\mathcal{A}^+) \subset \mathcal{B}^+$ . Moreover,  $\phi$  is called a  $k$ -positive map if the canonical extension map  $\text{id} \otimes \phi$  of  $\phi$  which is defined by  $M_n(\mathcal{A}) \ni [x_{ij}] \mapsto [\phi(x_{ij})]$ , is positive. If  $\phi$  is  $k$ -positive for each  $k \in \mathbf{N}$  then we say that  $\phi$  is completely positive. In this talk I give a survey about positive linear maps on matrix algebras historically and explain its application to Quantum information theory. I also give an example of a family of positive linear maps from  $M_3$  to  $M_3 \otimes M_3$  which is a joint work with Benoit Collins and Gunjan Sapura.