

# Re-discovery of $Z_c(3900)$ at BESIII Based on Quantum Machine Learning

Wednesday, 20 August 2025 14:50 (20 minutes)

Quantum Machine Learning (QML) is an advanced data analysis technique, which can detect data structures within massive datasets, building models to achieve data prediction, classification, or simulation, with less human intervention. However, the practical viability of QML still remains a topic of debate, requiring more examples of real data analysis with quantum hardware for its further verification.

Based on this background, our research focuses on the application of QML in the re-discovery of  $Z_c(3900)$ , which was first observed by BESIII collaboration in 2013 while analyzing the decay process of  $Y(4260)$ . Using the same  $525 \text{ pb}^{-1}$  data collected at  $\sqrt{s} = 4.26 \text{ GeV}$ , this study applies Quantum Support Vector Machine (QSVM) method to event selection criteria, using classical cut-based and ML-based analysis strategy as references. A 1-D fit will be applied to the selected dataset to extract the parameters of  $Z_c(3900)$  in order to evaluate the selection efficiency. The invariant mass distribution will then be plotted and compared with the results of traditional analysis.

**Primary author:** WU, Siyang (Shandong University)

**Co-authors:** ZOU, Jiaheng (高能所); MENG, Zhaoxia (University of Jinan); 李, 腾 (Shandong University); OKAWA (大川), Hideki (英希) (IHEP); LIN, Tao (高能所); LI, Weidong (高能所); HUANG, Xingtao (Shandong University)

**Presenter:** WU, Siyang (Shandong University)

**Session Classification:** Session