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## Measurement of the charge ratio and the spin polarization of the cosmic-ray muons with the Super-Kamiokande

Cosmic-ray muons are generated from the showers of secondary particles via the interactions of primary cosmic particles with air nuclei at the top of the atmosphere. Pions and kaons mostly decay into muons immediately, reflecting the details of the hadronic interactions depending on their energy. The charge ratio of the cosmic-ray muons can be used to constrain high energy hadronic interaction models in the atmosphere and the atmospheric neutrino/anti-neutrino ratio. Also, the spin polarization of the cosmic-ray muons constrains the spectrum shape of atmospheric neutrinos. In this poster presentation, we will report the result of the measurement of the charge ratio and spin polarization of the cosmic-ray muons using about 10 years of data collected by the Super-Kamiokande.

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