

736th ASRC Seminar

Date: Nov. 28 (Wed), 10:30~

Location: Room 302, ASRC Bldg.

Speaker: Dr. Koichiro Yamakawa

(Department of Physics, Gakushuin University)

Title: Nuclear dynamics in molecular monomers and clusters

Abstract:

Molecules including more than one hydrogen nuclei in the symmetric positions have several nuclear-spin isomers, and their interconversion has been attracted fundamental, astronomical, and industrial interest. Considering specific combinations of rotational and nuclear-spin states due to the Fermi-Dirac statistics, we have determined the nuclear-spin conversion rates in H₂, H₂O, NH₃, and CH₄⁻ by rovibrational spectroscopy to reveal the conversion mechanism and relaxation channels. Another topic is the molecular nanocluster, which provides a suitable stage for studying the nature of the intermolecular interaction. By using terahertz and infrared spectroscopy combined with the matrix isolation technique, we have investigated the nuclear dynamics, i.e., vibration and tunneling, in nanoclusters constructed of the simple molecules shown above through the hydrogen bond or van der Waals force. In the presentation, our recent challenge to detection of the nuclear spin flip just in molecular clusters will be also introduced.

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