

Atomic and Molecular Data Activities at NIFS in 2023-2025

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Atomic and molecular databases and related activities conducted at NIFS during 2023-2025 are reported. Numerical data on collision processes, found in literature, for fusion relevant elements as well as others for various applications such as astrophysics and plasma applications are stored in the databases. Data have been searched by help of working groups by Japanese collaborators. Total number of data record sets in the NIFS Atomic and Molecular Numerical Databases increases to be 1,886,166 which is nearly 15% increase since April, 2023. The data sets in AMDIS EXC, CHART, and AMOL databases are largely increased. Number of database access, counted as number of queries, also increases.

Related research on atomic data and spectroscopy on W, high Z elements such as lanthanides, Kr and BH, has been conducted by NIFS staff and collaborators. Plasma spectroscopy for Large Helical Device (LHD) and compact EBIT (CoBIT) has been carried out and many spectra were obtained. Theoretical calculations on atomic structure, collision cross sections, and collisional-radiative models for those elements and molecules have also been conducted. In addition, plasma parameters were derived from the analysis of the emission spectrum of the hydrogen pellet ablation cloud in LHD experiments. It was revealed that the parameters of the ablation cloud plasma are strongly correlated with the background plasma.

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