1. Unique properties of pair-plasmas and their experimental investigation

- Unique research subjects in plasma physics

Because of the mass symmetry, pair-plasmas are predicted to exhibit unique properties, which are fundamentally different from conventional ion-electron plasmas. Examples of such difference include remarkable wave propagation and stability properties, enhanced soliton behavior, the lack of Faraday rotation, and strong nonlinear Landau damping effects.

2. The PAX/APEX project with NEPOMUC, FRM-II

- Magnetic confinement of pair plasmas in toroidal configurations

The PAX/APEX project is supported by ERC, DFG, IPP, UCSD, and NIFS. This work was supported by JSPS KAKENHI No.25707043 and 16K00949.

3. Injection and trapping of positrons in a toroidal geometry

- Injection, efficient transport is needed across closed field lines

For injection, efficient transport is needed across closed field lines. Long and stable trapping properties are also essential. These experiments were done with permanent magnet trap.

4. Toward HTS dipole trap for pair-plasmas

- How can we create symmetric closed field lines?

For symmetric closed field lines, we need closed field lines / magnetic surfaces, which are realized by a magnetically levitated superconducting coil (or stellarator).

5. Overall plan of the compact SC dipole

- Step-by-step development of compact levitated dipole

6. Development work on the compact HTS dipole experiment

- Expected Trapping enhancement in the SC geometry

Based on AHS collaborative program with EST

- "F" and "C" HTS coils and impregnation

- HTS coil winding and impregnation test at U. Tokyo

- Feedback-controlled levitation of test magnet

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