博士論文公聴会の公示（物理学専攻）

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論文題目 : **Investigation of the Multiple-*q* Ordered States of Frustrated Magnets under Pulsed High Magnetic Fields**
（パルス強磁場を用いたフラストレート磁性体における多重 Q 秩序状態の研究）

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場所 : 理学研究科H棟 7 階物理大セミナー室（H701 号室）
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論文要旨:

A peculiar spin texture like a 'skyrmion-latiice (SL)' has been studied extensively from the viewpoint of realization of topological magnetic objects. It was theoretically suggested that the triple-*q* phase corresponding to SL appears in the classical two-dimensional triangular-lattice antiferromagnet. This multiple-*q* ordered state including SL has been considered as a nontrivial ordered state and thus is worth revealing its characteristics experimentally as well as theoretically. Recently, a triple-*q* phase similar to SL was observed in the neutron scattering experiments of the cubic diamond-lattice magnet $MnSc_2S_4$. In a compound without inversion symmetry, Dzyaloshinskii–Moriya interaction causes an appearance of SL and there are several experimental observations. On the other hand, $MnSc_2S_4$ has attracted a substantial interest as a first example of the triple-*q* ordered state due to the magnetic frustration.

In this study, we developed a high precise magnetization measurement apparatus in conjunction with a ^{3}He cryostat. Then, we performed high-field magnetization and specific heat measurements of $MnSc_2S_4$ to research possible multiple-*q* ordered states in a whole *H*-*T* space up to the field-induced ferromagnetic state. From the experimental results, we constructed the *H*-*T* phase diagram, in which we confirmed the several phases reported in the neutron scattering research. Furthermore, we found the existence of novel two phases surrounding the triple-*q* phase. We made an original classification whether multi-domain structure of single-*q* state or single-domain structure of triple-*q* by considering a hysteresis loop in the magnetization process due to the magnetic domain effect.