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Thermotransport effects in antiferromagnets

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This thesis investigates magnetic properties of an antiferromagnet Mn5Si3 in both collinear and noncollinear antiferromagnetic phases, which this compound evinces. The work is based on three distinct experimental approaches: The first one comprises measurements of magnetotransport phenomena (namely anisotropic magnetoresistance and Hall effects), the second one studies thermal counterparts of these effects (particularly the anomalous Nernst effect). Finally, we used scanning thermal gradient microscopy in order to observe the domain structure of Mn5Si3. The key outcome of the magnetotransport measurements is an observation of the Hall response in the collinear antiferromagnetic phase, which we attribute to the recently proposed crystal Hall effect. Furthermore, the thermotransport measurements resulted in the first observation of the anomalous Nernst effect in this compound. Due to the variety of artefacts, we did not record any convincing image of the domain structure in Mn5Si3. The analysis of the artefacts was supported by mathematical modelling that helped to pinpoint their origin.

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