# MA 20: Altermagnets III

Time: Tuesday 14:00–15:30 Location: HSZ/0002

MA 20.1 Tue 14:00 HSZ/0002

**Curvature-induced magnetization of altermagnetic films** — •Kostiantyn Yershov[1,2], Volodymyr Kravchuk[1,2], and Jeroen van den Brink[1] — [1]Leibniz Institute for Solid State and Materials Research, 01069 Dresden, German — [2]Bogolyubov Institute for Theoretical Physics, 03143 Kyiv, Ukraine

Here we generalize the previously developed phenomenology of the $d$-wave altermagnetic films for the case of a curvilinear film bent in a stretching-free manner. We show that a stretching-free bending of a thin altermangnetic film with nonzero curvature gradients induces local magnetization that is approximately tangential to the film. The origin of curvature-induced magnetization is non-uniformity of the Neel vector distribution generated by the non-zero curvature gradients. The magnitude of the curvature-induced magnetization is determined by the curvature gradient and the direction of bending relative to the crystallographic axes. The maximal effect is achieved when bending is in the direction of maximum altermagnetic splitting in the magnon spectrum. For a periodically bent film of sinusoidal shape possesses a total magnetic moment per period $\propto A^2q^4$ where $A$ and $q$ are the bending amplitude and wave vector, respectively. The total magnetic moment is perpendicular to the plane of the unbent film and its direction (up or down) is determined by the bending direction.

MA 20.2 Tue 14:15 HSZ/0002

**Strain controlled g -to d-wave transition in altermagnetic CrSb** — Bennet Karetta[1], •Xanthe Verbeek[1], Rodrigo Jaeschke-Ubiergo[1], Libor Šmejkal[2,3,4], and Jairo Sinova[1,5] — [1]Insitut für Physik, Johannes Gutenberg-Universität Mainz, D-55099 Mainz, Germany — [2]Max-Planck-Institut für Physik Komplexer Systeme, Nöthnitzer Str. 38, 01187 Dresden, Germany — [3]Max-Planck-Institut für Chemische Physik Fester Stoffe, Nöthnitzer Str. 40, 01187 Dresden, Germany — [4]Institute of Physics, Academy of Sciences of the Czech Republic, Cukrovarnická 10, Prague 6, Czech Republic — [5]Department of Physics, Texas A&M University, College Station, Texas 77843-4242, USA

We demonstrate a strain-induced transition in the g-wave altermagnet CrSb, revealing how shear strain can tune spin symmetries and enable new responses. Focusing on the spin-splitter effect, which allows for pure spin currents but is forbidden in unstrained CrSb, we identify four shear-strain directions that lower the symmetry and enable spin conductivity. These strains induce three d-wave altermagnetic states and one uncompensated magnetic phase, each with distinct spin symmetries. Using both a minimal model and first-principles calculations, we confirm the emergence of these phases and show that their key features remain robust in the presence of spin-orbit coupling. We predict a spin-splitter effect of up to 5% under just 1% strain, showing that even small deformations can generate sizable spin-splitter currents. Our findings highlight strain as a precise and effective tool for controlling symmetry-driven spin phenomena in altermagnets.

MA 20.3 Tue 14:30 HSZ/0002

**Designing non-relativistic spin-splitting in transition metal oxide bulk and heterostructures** — •Subhadeep Bandyopadhyay and Rossitza Pentcheva — Department of Physics, University of Duisburg-Essen, Duisburg, Germany

Non-relativistic spin splitting (NRSS) of bands in collinear antiferromagnets is an exotic phenomenon, that has currently shifted in the focus, owing to the great potential for various spintronic applications. Studies showed that the inhomogeneous distribution of the real space magnetization density, originating from the ferroically ordered magnetic octupole moments[1] is the key to this exotic phenomenon, which stems from the global time reversal symmetry (TRS) breaking in antiferromagnets. In perovskite $ABO_3$ materials, we find an intriguing correlation between the antiferroic distortion patterns and the antiferromagnetic order, that breaks TRS to induce NRSS[2].

Here we explore how structural distortions and antiferromagnetism combine to induce NRSS in perovskites. Building on that insight, we demonstrate the recipe to design and control the NRSS. Beyond the bulk compounds, the discussion is extended to the perovskite heterostructures, where interface-driven structural distortions and modifications of the electronic properties are crucial.

1. S Bhowal and N A Spaldin, Phys. Rev. X 14, 011019 (2024)
2. S. Bandyopadhyay, S Picozzi, S Bhowal, Phys. Rev. B 112, 064405, (2025)

MA 20.4 Tue 14:45 HSZ/0002

**hall viscosity of altermagnet** — •iksu jang[1], rui aquino[2], rafael fernandes[3,4], and jörg schmalian[1,5] — [1]Institute for Theory of Condensed Matter, Karlsruhe Institute of Technology, Karlsruhe 76131, Germany — [2]ICTP, South American Institute for Fundamental Research Instituto de Física Teórica da UNESP, Universidade Estadual Paulista, Rua Doutor Bento Teobaldo Ferraz 271, 01140-070 São Paulo, Brasil — [3]Department of Physics, The Grainger College of Engineering, University of Illinois Urbana-Champaign, Urbana, Illinois 61801, USA — [4]Anthony J. Leggett Institute for Condensed Matter Theory, The Grainger College of Engineering, University of Illinois Urbana-Champaign, Urbana, Illinois 61801, USA — [5]Institute for Quantum Materials and Technologies, Karlsruhe Institute of Technology, Karlsruhe 76131, Germany

Altermagnets have garnered significant interest due to their ability to exhibit spin splitting without spin orbit coupling and their symmetry-driven phenomena, such as elastic quantum criticality and elasto-Hall responses. In this work, we investigate the Hall viscosity of altermagnets subject to strain. Using group-theoretical analysis and tight-binding calculations, we show that altermagnetic systems with various form factors can host a finite Hall viscosity. We additionally propose that the acoustic Faraday effect offers a viable route for its experimental detection.

MA 20.5 Tue 15:00 HSZ/0002

**Dynamical orbital pumping in altermagnets** — •Guidobeth Sáez-Toro[1], Mirco Sastges[2], Myunil Choi[3], Dongwook Go[3], and Yuriy Mokrousov[2] — [1]Departamento de Física, Facultad de Ciencias, Universidad de Chile, Santiago 7800024, Chile — [2]Peter Grünberg Institute (PGI-6), Forschungszentrum Jülich, 52425 Jülich, Germany — [3]Department of Physics, Korea University, Seoul 02841, Republic of Korea

Altermagnets constitute a recently recognized class of magnetic materials in which symmetry breaking between sublattices and orbital degrees of freedom gives rise to unconventional magnetic responses. A direct consequence of this symmetry structure is that time-dependent magnetization generates a purely orbital pumping mechanism, $\partial_t\langle \mathbf{L}\rangle_\alpha = \chi^L_{\alpha\beta}\,(\hat{\mathbf{m}}\times\partial_t\hat{\mathbf{m}})_\beta$, mediated by spin-orbit coupling. We investigate this effect by driving the Néel order in a minimal tight-binding model on a square altermagnetic lattice, based on an antiferromagnetic array of spins with an orbital crystal field breaking both $C_4$ rotational and sublattice exchange symmetries. Our results reveal a pronounced sublattice dependence of the orbital response, providing a clear microscopic distinction between antiferromagnetic and ferromagnetic configurations. Using the Bastin-Smrcka-Streda Kubo formula, we compute the full response tensor and show that orbital pumping naturally decomposes into two robust contributions, analogous to field-like and damping-like components. These findings establish orbital pumping as a distinctive dynamical signature of altermagnets and highlight its potential for next-generation orbitronic functionalities.

MA 20.6 Tue 15:15 HSZ/0002

**Unique responses in odd-parity nodal p-wave magnets** — •Atasi Chakraborty[1], Anna Birk Hellenes[1], Rodrigo Jaeschke Ubiergo[1], Tomas Jungwirth[2,3], Libor Šmejkal[2,4], and Jairo Sinova[1,5] — [1]Institut für Physik, Johannes Gutenberg Universität Mainz — [2]Institute of Physics, Academy of Sciences of the Czech Republic — [3]School of Physics and Astronomy, University of Nottingham — [4]Max Planck Institute for the Physics of Complex Systems,Dresden — [5]Department of Physics, Texas A & M University

The recent discovery of Altermagnetism – spin-split even-parity compensated magnets – highlights how spin symmetries can reveal exchange-driven phenomena that has previously been overlooked. Building on this insight, we explore spin symmetry criteria [1,3] to identify the odd-parity magnetic states in noncollinear systems, focusing on effects driven purely by exchange interactions, independent of spin-orbit coupling. In this talk, I will focus on the lowest-order (pwave) nodal odd-parity magnets, and discuss their characteristic responses [1, 2]. We show that these p-wave magnetic phases spontaneously break crystal symmetries, leading to pronounced exchange-mediated resistive anisotropy [1] and exhibit a large, purely non-relativistic, anisotropic out-of-plane charge-to-spin conversion [2], fundamentally distinct from the conventional Rashba-Edelstein effect.

1. Hellenes, Jungwirth, Ubiergo, Chakraborty, Sinova, Šmejkal, arXiv:2309.01607v3 (2020). 2. Chakraborty, Hellenes, Ubiergo, Jungwirth, Šmejkal, Sinova, Nature Communications 16, 7270 (2025). 3. Jungwirth, Fernandes, Sinova, Šmejkal, arXiv:2409.10034v1 (2024)