

Karine Chesnel

Brigham Young University
N 319 ESC
Provo, Utah 84602
Office: 801-422-5687
kchesnel@byu.edu



Curriculum Vitae

- 2008 - Assistant Professor** in Physics at Brigham Young University, Utah
- 2007 : Post-doc** at the Laboratoire National des Champs magnétiques Pulsés (CNRS),
Toulouse, France
- 2003-2006: Post-doc** at the Lawrence Berkeley National Laboratory, California
- 1999-2002: Ph.D.** program in Physics (Condensed Matter), at ESRF, Grenoble, France.
Subject: "Magnetic nanostructures studied with X-ray Resonant Magnetic Scattering"
- 1998-99: DEA** "Condensed Matter Physics" at University Joseph Fourier, France
- 1997-98: Agrégation** (University teaching diploma) in Physics, Paris, France
- 1996-97: M. S.** in Physics, Ecole Normale Supérieure, Lyon, France
- 1995-96: B. S.** in Physics and in Chemistry, Ecole Normale Supérieure, Lyon, France
- 1992-95:** Undergraduate studies in Sciences, Aix-en-Provence, France
- 1992 French Baccalaureat** (scientific section), Aix-en-Provence, France

Current Research Interests

Investigate the electronic and magnetic properties in condensed matter at the nanoscale, using microscopy, magnetometry, and the interaction with electromagnetic radiation: spectroscopy, circular and linear dichroism, X-ray diffraction, diffuse scattering, resonant magnetic scattering, use of coherent light, speckles metrology, lensless imaging, as well as X-ray and electron microscopy techniques. I am interested in studying confinement effects in nanostructures, nanoparticles, thin films, exchange bias systems, spin reorientation transitions, highly correlated systems, and probing the magnetic ordering, domain switching, spatio-temporal fluctuations and fast dynamic phenomena.

Research experience

2007 (Jan-Dec): Research position at the **Laboratoire des champs magnétiques pulsés (CNRS)** at Toulouse, France. Study of phase transitions in polycrystals under high magnetic fields. Experiments performed via X-ray diffraction under intense magnetic fields, generated by intense current pulses (30T), at the synchrotron facility in Grenoble (**European Synchrontron Radiation Facility**) .

Techniques

- Hard X-ray diffraction (XRD) under intense magnetic field

2003-2006: Post-doc at **Advanced Light Source**, Lawrence Berkeley National Laboratory. Development of coherent X-ray resonant magnetic scattering, including the assembling, installation and characterization of a new instrumentation (scattering chamber, pumping system, manipulator, cryostat, electromagnets and detectors). I helped to initiate several scientific projects and collaborations with the first users of the instrument and to work on a specific research area focusing on magnetic properties in nanostructures like nanoparticles, or exchange bias thin films. I have been also involved with complementary scattering and spectroscopy experiments at the ALS.

- Soft X-ray spectroscopy and circular dichroism (XMCD)
- Soft X-ray resonant magnetic scattering (XRMS)
- Coherent scattering (speckle)
- Pinhole preparation (FIB)

1999-2002: PhD in the group of Physics of Materials and Microstructures at the CEA-Grenoble, France, studying striped magnetic domains of thin films of FePd alloys and Co/Pt multilayers with strong magnetic anisotropy.

- Soft X-ray resonant magnetic scattering using synchrotron sources: **ESRF (France)**, and **Daresbury Laboratory (SLS)**, UK.
- Molecular Beam Epitaxy and sputtering
- Magnetic Force Microscopy
- Magnetometry (VSM, MOKE, Hall effect)

1997: Master's training in the group of Condensed Phases Dynamic, at the University of Montpellier, France, studying the vibrational dynamic and the phase's transitions of the fullerenes C₆₀, Cs C₆₀ and C₅₉N.

- Raman spectroscopy
- Infrared Absorption Spectroscopy
- Inelastic Neutron Scattering in the **LLB** laboratory, Saclay, France.

1996: Degree's training in the group of Ion-Molecules Interactions, at the University of Marseille, France, studying the hyperfine electronic structure of Rubidium atoms.

- Infrared spectroscopy using a laser diode.

Teaching Experience

- At Brigham Young University, Provo, Utah:

Quantum Mechanics, applications (Phys 452), Winter 2010

Quantum Mechanics, principles (Phys 451), Fall 2009, 2010

Newtonian Mechanics (Phys 121), Winter 2008, Fall 2008, Winter 2009

- During education:

Agrégation (French national teaching diploma) at the Ecole Normale Supérieure, France, in the field of General Physics, which includes Mechanics, Thermodynamic, Electromagnetism, Optic, Acoustic, Electricity and Solid State Physics.

Teaching experience while in graduate school: I taught both undergraduate and graduate classes during my Ph.D. program at the University Joseph Fourier, in France. I helped labs and group classes, for 3 years (6 semesters) between 1999 and 2002. Topics covered Mechanics, Electromagnetism and Optics. I also participated to teaching training programs during that period.

List of publications

26. *Oscillating spatial dependence of domain memory in ferromagnetic films mapped via x-ray speckle correlation* **K. Chesnel**, J.Nelson, S.D. Kevan, M.J. Carey and E.E. Fullerton
[Physical Review B](#), accepted, January 2011

25. *Persistence of Magnetic Domain Memory Through Field Cycling in Exchange Bias Thin Films*
Joseph Nelson, Brian Wilcken and **Karine Chesnel**
[Journal of Utah Academy of Sciences, Letters and Arts](#) (2010)
Awarded Best Paper in category Physical Sciences by the Utah Academy

24. *Magnetic memory in ferromagnetic thin films via exchange coupling*
K. Chesnel, E. E. Fullerton, M. J. Carey, J. B. Kortright, and S. D. Kevan
[Phys. Rev. B](#) **78**, 132409 (2008)

23. *Influence of interface exchange coupling in perpendicular anisotropy [Pt/Co]₅₀/TbFe bilayers* S. Mangin, T. Hauet, P. Fischer, D. H. Kim, J. B. Kortright, **K. Chesnel**, E. Arenholz, and Eric E. Fullerton
[Phys. Rev. B](#) **78**, 024424 (2008)

22. *Probing complex materials with coherent X-rays*
K. Chesnel, J.J. Turner, M. Pfeifer and S.D. Kevan
[Appl. Phys. A: Mater. Sci. Process.](#) **92**, 431 (2008)

21. *Orbital domain dynamics in a doped manganite*
J.J. Turner, K.J. Thomas, J.P. Hill, M.A. Pfeifer, **K. Chesnel**, Y. Tomioka, Y. Tokura and S.D. Kevan
[New J. Phys.](#) **10**, 053023 (2008)

20. *Nucleation weak stripe domains: determination of exchange and thermal anisotropy variations*
G. Asti, M. Ghidini, M. Mulazzi, R. Pellicelli, M. Solzi, **K. Chesnel** and A. Marty
[Phys. Rev. B](#) **76**, 094414 (2007)

19. *Combined neutrons and synchrotron studies of magnetic films*
S.K. Sinha, S. Roy, M.R. Fitzsimmons, S. Park, M. Dorn, O. Petravic, I.V. Roshchin, Zhi-Pan Li, X.Battle, R. Morales, A. Misra, X. Zhang, **K. Chesnel**, J.B. Kortright and I.K. Schuller,
[Pramana Journal of Physics](#) **67** (1), 47-55 (2006)

18. *Depth profile of uncompensated spins in the antiferromagnetic layer of an exchange bias system*
S. Roy, M.R. Fitzsimmons, S. Park, M. Dorn, O. Petravic, I.V. Roshchin, Zhi-Pan Li, X.Battle, R. Morales, A. Misra, X. Zhang, **K. Chesnel**, J.B. Kortright, S.K. Sinha and Ivan K. Schuller,
[Phys. Rev. Lett.](#) **95**, 047201 (2005)

17. *Characterization of FePd bilayers and trilayers using soft x-ray resonant magnetic scattering and micromagnetic modeling* G. Beutier, G. van der Laan, **K. Chesnel**, A. Marty, M. Belakhovsky, S. P. Collins, E. Dudzik, J.-C. Toussaint, and B. Gilles.
[Phys. Rev. B](#) **71**, 184436 (2005)

16. *Disorder-induced microscopic magnetic memory*
M.S. Pierce, C.R. Buechler, L.B. Sorensen, J.J. Turner, S.D. Kevan, E.A. Jagla, J.M. Deutsch, T. Mai, O. Narayan, J.E. Davies, K. Liu, J. Hunter Dunn, **K. Chesnel**, J.B. Kortright, O. Hellwig, E. E. Fullerton
[Phys. Rev. Lett.](#) **94**, 017202 (2005)

15. *Interparticle magnetic correlations in dense Co nanoparticle assemblies*
J. B. Kortright, O. Hellwig, **K. Chesnel**, S. Sun, and E. Fullerton.
[Phys. Rev. B **71**, 012402 \(2005\)](#)
14. *Surface and bulk spin ordering of antiferromagnetic materials: NiO(111)*
Antoine Barbier, Cristian Mocuta, Wolfgang Neubeck, Mattia Mulazzi, Flora Yakhou, **Karine Chesnel**, Alberic Sollier, Christian Vettier and Francois de Bergevin
[Phys. Rev. Lett. **93**, 257208 \(2004\)](#)
13. *Tracking the local reversal processes in nanostructures by magnetic speckles*
K. Chesnel, M. Belakhovsky, G. van der Laan, F. Livet, A. Marty, G. Beutier, S. P. Collins, and A. Haznar. [Phys. Rev. B **70**, 180402\(R\) \(2004\)](#)
12. *Hysteresis effect in FeP magnetic stripes studied by coherent soft X-ray resonant magnetic scattering* **K. Chesnel**, G. van der Laan, F. Livet, G. Beutier, A. Marty, M. Belakhovsky, A. Haznar and S.P. Collins [J. Synchrotron Rad. **11**, 469-475 \(2004\) – cover illustration](#)
11. *Stripe domains nucleation observed by X-ray magnetic scattering: temperature variation of exchange and anisotropy*, M. Mulazzi, **K. Chesnel**, A. Marty, G. Asti, M. Ghidini, M. Solzi, M. Belakhovsky, N. Jaouen, J. M. Tonnerre and F. Sirotti
[J. Mag. Magn. Mat., **272** E895 \(2004\)](#)
10. *Polarization effects in x-ray resonant magnetic scattering patterns from striped FePd films*, **K. Chesnel**, M. Belakhovsky, A. Marty, G. Beutier, G. van der Laan, S.P. Collins
[Physica B, **345**, 148 \(2004\)](#)
9. *Soft X-ray Resonant Magnetic Scattering from Fe Pd thin films: study of the micromagnetic components*, G. Beutier, **K. Chesnel**, A. Marty, M. Belakhovsky, J-C. Toussaint, B. Gilles, G. van der Laan, S. Collins, E. Dudzik. [Physica B, **345**, 143 \(2004\)](#)
8. *Magnetic anisotropy of nanostructures FePd studied by soft x-ray resonant magnetic scattering, magnetic force microscopy and micromagnetic modeling*
G. van der Laan, **K. Chesnel**, M. Belakhovsky, A. Marty, F. Livet, S.P. Collins, E. Dudzik, A. Haznar, J.P. Attane, [Superlattices Microstruct., **34**, 107-126 \(2003\)](#).
7. *Soft-x-ray magnetic speckles from a nanostructured FePd wire*
K. Chesnel, M. Belakhovsky, F. Livet, S. P. Collins, G. van der Laan, S. S. Dhesi, J. P. Attané, and A. Marty, [Phys. Rev. B **66**, 172404 \(2002\)](#)
6. *X-ray resonant magnetic scattering study of the magnetic coupling in Co/Pt nanolines and its evolution under magnetic field*
K. Chesnel, M. Belakhovsky, S. Landis, J. C. Toussaint, S. P. Collins, G. van der Laan, E. Dudzik, and S. S. Dhesi, [Phys. Rev. B **66**, 024435 \(2002\)](#)
5. *Magnetic coupling in Co/Pt multilayers on etched silicon studied by XRMS*,
K. Chesnel, M. Belakhovsky, S. Landis, B. Rodmacq, G. van der Laan, E. Dudzik, S.P. Collins, S.S. Dhesi, 8th Joint MMM-Intermag Conf., [IEEE Trans. Magn. **37**, 1661 \(2001\)](#)
4. *Soft x-ray magnetic scattering from striped magnetic domain structures*,
G. van der Laan, E. Dudzik, S.P. Collins, S.S. Dhesi, H.A. Dürr, M. Belakhovsky, **K. Chesnel**, A. Marty, Y. Samson, B. Gilles, [Physica B, **283**, 171-174 \(2000\)](#)

3. Influence of perpendicular magnetic anisotropy on closure domains studied with x-ray resonant magnetic scattering E. Dudzik, S.S. Dhesi, H.A. Dürr, S.P. Collins, M.D. Roper, G. van der Laan, **K. Chesnel**, M. Belakhovsky, A. Marty, Y. Samson
Phys. Rev. B **62**, 5779 (2000)

2. Inelastic neutron scattering investigation of quenched CsC₆₀ phases
J.L. Sauvajol, **K. Chesnel**, E. Anglaret
Solid State Comm., **108**, 781-785 (1998)

1. Vibrational properties of polymers and quenched CsC₆₀ phases
J.L. Sauvajol, **K. Chesnel**, E. Anglaret
J.Chim.Phys., **95**, 1441-1444 (1998)

Conferences and seminars

International conferences

XIIe Conference on Condensed Matter, 2010, Troyes, France (invited talk)
APS March Meeting 2010, Portland, USA
APS March Meeting 2009, Pittsburgh, USA
European Material Research Conference 2007, Warsaw, Poland (invited talk)
Workshop on Diffraction, HASYLAB 2007, Hamburg, Germany (invited talk)
School of Magnetism 2007, Cargese, Corsica
Coherence 2007, Monterrey, California
Coherence 2005, Porquerolles, France
Workshop SOLEIL Soft-X microscopy, 2005, France (invited talk)
APS March meeting 2005, Los Angeles, USA
APS March meeting 2004, Montreal, Canada
MRS Fall meeting 2003, Boston (invited talk)
ALS user meeting 2004, Berkeley
ALS user meeting 2003, Berkeley (invited talk)
ESRF user meeting 2002, France (invited talk)
Intermag-MMM 2001, San Antonio Texas

Invited Seminars

NSLS, Brookhaven National Lab, New York, 24 May 2010
Utah Valley University, Utah, 17 Feb 2010
Idaho State University, Pocatello, Idaho, 20 April 2009
Arizona State University, Phoenix, Arizona, 2 October 2008
Utah Valley State College, Utah, 5 March 2008
University Pierre et Marie Curie, France, 17 May 2006
Lawrence Livermore National Laboratory, California 10 May 2006
SUNY Albany, New York, 12 April 2006
Swiss Light Source, Switzerland, 15 Jan 2006
Argonne National Laboratory, Illinois, 12 Dec 2005
Brigham Young University, Utah, 16 Nov. 2005
Brookhaven National Laboratory, New York, 17 March 2005
BESSY, Berlin, Germany, 18 Feb. 2005