Curriculum Vitae

Liu, Zhaosen
Ph.D and Professor

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Education and Employment

1978.3 — 1981.12**:** A student of Jiangsu Normal University, specialized in physics, earned B.S. degree.

1982.1 — 1984.8: A teaching assistant of the Physics Department of the above university.

1984.9 — 1988.4: A graduate student of Acoustics Institute, Chinese Academy, obtained M.S. degree.

1988.6 — 1992.8: A lecturer of China University of Mining Technology.

1992.9 — 1996.4: A postgraduate student of Helsinki University of Technology (HUT), Finland. obtained licentiate degree.

1996.5 — 1999.7: Studied at TU Dresden, Germany, obtained Ph.D degree in physics.

2003. 3 — : A teacher and researcher at Nanjing University of Information Science and Technology, obtained a full professorship in 2004.

2015.4 -- : Visiting research fellow at University of Macau.

Research Experience

(1) 1996-1999: Built a theoretical model to calculate the magnetizations and specific heats for rare-earth compounds both in the absence and presence of external magnetic field.

(2) 2001-2007: Applied perturbation theory to derive analytic formula connecting the RKKY coupling parameters and magnetic transition temperatures, so as to investigate the roles played by the crystal-field levels and RKKY exchanges in the magnetic processes.

(3) 2008: Developed a theoretical approach to calculate the magnetic resistivity of rare-earth crystals quantitatively, found a new mechanism to explain the negative magnetic resistivity.

(4) 2008-2009: Proposed the two-sublattice model to explain the magnetism of rare-earth antiferromagnets, used perturbation theory to derive formulas for magnetic transition temperatures, so as to investigate the roles played by the crystal field levels and RKKY exchange, etc., in the magnetic processes.

(5) 2010-2012: Built a quantum simulation model and proposed a new computational algorithm (self-consistent algorithm: SCA) for magnetic nanosystems, to investigate their magnetic structures and magnetic properties. The new computing algorithm has accelerated computational speed considerably.

(6) 2013: Proposed a new quantum Monte Carlo method for nanomagnets. The calculated magnetic structures, magnetizations, etc, for a ferromagnetic and an antiferromagnetic nanoparticles, are identical to those obtained with SCA approach. So the two methods are complementary and verified mutually. The existing quantum Monte Carlo method for spin systems only evaluates the ground states of magnetic systems. In contrast, my new QMC method is able to calculate all eigenstates of a nanosystem, and consider them in evaluating all physical quantities, therefore it possible to describe the magnetic behavior at all temperatures.

(8) 2015: The SCA simulation approach was successfully applied to finite mono-layer ferromagnetic and antiferromganetic nanorodisks with Dzyaloshinsky-Moriya interaction, it generated magnetic vortices on the disk with almost perfect symmetry, and the calculated results agree well experimental findings and a grid theory. We find that an external magnetic field and uniaxial anisotropy both normal to the nanodisks are able to reconstruct, stabilize or induce the magnetic vortex, and further including long distance dipole-dipole interaction in simulation has the similar effects.

(10) 2015: The SCA simulation approach was successfully applied to single-wall FM and AFM nanotubes, nanotubes, one-dimensional magnetic chain models were built. The numerical approach and theoretical models produced exactly identical results.

(11) 2015: The SCA simulation approach was successfully applied to double-walled FM and AFM nanotubes consisting of mixed spins. When spin frustration occur, two phases with distinct spin structures are formed. The Ising-like character of the nanosystems enable us to build theoretical models based on quantum theory. The results obtained with the numerical approach and theoretical models agree quite well.

Editor for a book *Rare-Earths: New Research*, Nova Science publishers, 2014

https://www.novapublishers.com/catalog/product_info.php?products_id=42358&osCsid=9adb506a1412af46494102ebf7a6c67a

Selected Publications

(36) Liu Z.-S. , H. Ian, Duality of Two Pairs of Frustrated Double-Walled Nanotubes Consisting of S = 1 and S = 3/2 Spins Probed by Means of a Quantum Simulation Approach, submitted.

(35) Liu Z.-S. , H. Ian, Theoretical Studies on Frustrated Double-Walled Nanotubes Consisting of S = 1 and S = 3/2 Spins , to be submitted

(34) Liu Z.-S., H. Ian, A self-consistent approach to the one-dimensional chain models for the ferro- and antiferro-magnetism of nanotubes, arXiv:1509.06885 [cond-mat.mes-hall]

(33) Liu Z.-S., H. Ian, Effects of External Magnetic Field and Magnetic Anisotropy on Chiral Spin Structures of Square Nanodisks Investigated with a Quantum Simulation Approach, Superlattices and Microstructures, 92 (2016) 174－180.

(32) Liu Z.-S., H. Ian, Numerical Studies on Antiferromagnetic Skyrmions in Nanodisks by Means of a New Quantum Simulation Approach, Chemical Physics Letters 649 (2016) 135-140

(31) Liu Z.-S., H. Ian, Effects of Dzyaloshinsky-Moriya Interaction on magnetism in Nanodisks from a Self-Consistent Approach, J Nanopart Res (2016) 18:9.

(30) Liu Z.-S., V. Sechovský, and M. Diviš, Mutual verification of two new quantum simulation approaches for nanomagnets, Physica E 62, 123–127 (2014)

(29) Liu Z.-S., V. Sechovský, and M. Diviš, , Success of a simulation approach for magnetic nanosystems: Power of physical laws，Physica E 59, 27 (2014).

(28) Liu Z.-S， YANG Cui-Hong, GU Bin, MA Rong， LI Qing-Fang，The Application of a New Simulation Approach to Ferrimagnetic Nanowires， CHIN. PHYS. LETT. Vol. 30, No. 9 (2013) 097302

(27) Liu Z.-S., V. Sechovský, and M. Diviš, A new combined quantum simulation approach for nanomagnets, Physica E 47 (2013) 128–133

(26) Liu Z.-S., V. Sechovský, and M. Diviš, Magnetic Properties of a 3d Nanoparticle (S=5/2) Studied with a Quantum Simulation Model, Physica E, 44 (2012) 826–832

(25) Liu Z.-S., V. Sechovský, and M. Diviš, Magnetism of $DyNi_2B_2C$ nanoparticle investigated with a quantum simulation model, Phys. Status Solidi B, 249, 202–208 (2012)

(24) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetism of $PrAl_2$ nanoparticle investigated with a quantum simulation model， J. Phys.: Condens. Matter 23 (2011) 016002

(23) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetic Properties of a Rare-Earth Antiferromagnetic Nanoparticle Investigated with a Quantum Simulation Model, CHIN. PHYS. LETT. 28 (2011) 067302

(22) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetism of $ErNi_2B_2C$ investigated with a two-ion model for rare-earth antiferromagnets, Journal of Physics and Chemistry of Solids, 72 (2011) 983–987

(21) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetic and thermodynamic properties of $DyFe_2Si_2$ further investigated with crystal-field theory and two-ion mode, Journal of Physics and Chemistry of Solids, 71 (2010) 1447-1450

(20) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetic Orderings and Néel Temperature of $TbNi_2B_2C$, Chin. Phys. Lett. 26 (2009) 107504

(19) Liu Z.-S., M. Diviš, and V. Sechovský, The Magnetic Properties of $TbNi_2B_2C$ Investigated with a Two-Sublattice Model, Chin. Phys. Lett. 26 (2009) 067501

(18) Liu Z.-S., M. Diviš, and V. Sechovský , Magnetic properties of $DyFe_2Si_2$ studied with a two-ion model for rare-earth antiferromagnets, Phys. Status Solidi B 246, (2009) 448–451

(17) Liu Z.-S., M. Diviš, and V. Sechovský The magnetic properties of $DyFe_2Si_2$ and its crystal-field levels, Phys. Status Solidi B, 246 (2009) 1372– 1376

(16) Liu Z.-S., Magnetic properties of $DyNi_2B_2C$ studied with a two-ion model for antiferromagnets, Appl Phys A 95 (2009) 443–445

(15) Liu Z.-S., M. Diviš, and V. Sechovský, Magnetic properties of rare-earth antiferromagnets studied using a two-ion model，Phys. Rev. B 78 (2008) 214409

(14) Liu Z.-S., M. Diviš, and V. Sechovský, Specific heat and magnetic ordering of ErBi studied with crystal-field theory in the mean-field approach, Physica B 403 (2008) 3439-3442

(13) Liu Z.-S., M. Diviš, and V. Sechovský, The magnetism of $PrPd_2Ga_3$, Physica B 393 (2007) 83–87

(12) Liu Z.-S., M. Diviš, and V. Sechovský， Specific heat and magnetic ordering of $NdNi_2B_2C$, Phys. Lett. A 371 (2007) 344-347

(11) Liu Zhaosen， Magnetism of Rare-Earth Compounds with Non-Magnetic Crystal-Field Ground Levels, Chinese Physics Letters, 24 (2007) 207.

(10) Liu Zhaosen, Reduced Magneto-Resistivity of a Rare-Earth Crystalline and the Degeneracy Removals of Its Crystal-Field Levels, Chinese Physics Letters, 24 (2007) 2052

(9) Liu Z.-S., M. Diviš and V. Sechovský, A computational model for rare-earth ferrimagnets and antiferromagnets, Physica B: Condensed Matter 367 (2005) 48-52

(8) Liu Z.-S. The susceptibilities and molecular-field constants of rare-earth compounds from mean-field theory Materials Letters, Volume 58, (2004) 3111-3114

(7) Liu Z.-S. The magnetic orderings and phase transitions of rare-earth rhodium borides Solid State Communications, 131 (2004) 135-139

(6) Liu Z.-S. and S. -L. Guo Transition temperatures of rare-earth compounds studied with perturbation theory Physics Letters A, 314 (2003) 491-497

(5) Liu Z.-S. and S. -L. Guo The mechanism of ferromagnetic ordering in $PrNi_{3.9}Cu_{1.1}$
Physics Letters A, 314, (2003) 244-249

(4) Liu Z.-S., J. -G. Park, Y. S. Kwon, K. A. McEwen and M. J. Bull, Crystal-field excitations and model calculations of CeTe2 Journal of Magnetism and Magnetic Materials, 256 (2003) 151-157.

(3) Liu Z.-S. and J. -G. Park, The origin of ferromagnetic ordering in $PrNi_{3.9}Cu_{1.1}$, Physica B: Condensed Matter, 322 (2002) 133-139

(2) Liu Zhaosen, Susceptibilities of SmPd2Al3 and $SmPd_2Ga_3$ studied with a crystal-field model and an ab initio approach, Phys. Rev. B 64,144407 (2001)

(1) Liu Zhaosen, et al., Calculation of paramagnetic susceptibilities and specific heats by density-functional– crystal-field theory: $PrPd_2X_3$ and $NdPd_2X_3$ (X=Al, Ga), Physica Rev. B 60 (1999) 7981