

Dr Boris CHESCA, Lecturer in Physics

Research interests

Superconducting and magnetic thin film structures

Experiment

Materials: cuprates, low- T_c superconductors, magnetic materials, etc.

Fabrication: Josephson junctions, tunnel junctions, SQUIDs

Measurements: electric transport (dc, high frequency) and spin transport

low temperatures: (1-300) K

magnetic fields: (0-9) T

Physics: Josephson effect, Andreev reflection

Unconventional superconducting order parameter

spin polarization transport in junctions

Sine-Gordon non-linear dynamics, phase-locking, device physics

Applications: qubits, spintronics

Theory

Non-linear dynamics

Analytics: Fokker-Planck equations, thermally activated phenomena

Numerics: sine-Gordon equations

Density of states calculations

Further information

Publications List

Journal Papers - Academic Journals

B. Chesca, D. Dönitz, T. Dahm, R. Huebener, D. Koelle, R. Kleiner, A. Ariando, H. Hilgenkamp, Observation of Andreev bound states in $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}/\text{Au}/\text{Nb}$ ramp-type junctions, *Phys. Rev. B* **73**, 014529 (2006).

B. Chesca, M. Seifried, T. Dahm, N. Schopohl, D. Koelle, R. Kleiner, A. Tsukada, Observation of Andreev bound states in bicrystal grain-boundary Josephson junctions of the electron doped superconductor $\text{La}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$, *Phys. Rev. B* **71**, 104504 (2005).

B. Chesca, K.Ehrhardt, M. Mößle, R. Straub, D. Koelle, R. Kleiner, and A. Tsukada, Magnetic Field Dependence of the Maximum Supercurrent of $\text{La}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$ Interferometers: Evidence for a Predominant $d_{x^2-y^2}$ Superconducting Order Parameter, *Phys. Rev. Lett.* **90**, 057004 (2003).

B. Chesca, R.R. Schulz, B.Goetz, C.W. Schneider, H. Hilgenkamp, and J. Mannhart, d-wave induced zero-field resonances in dc π -superconducting quantum interference devices, *Phys. Rev. Lett.* **88**, 177003 (2002).

John Clarke, T.L. Robertson, B.L.T. Plourde, A. García-Martínez, P.A. Reichardt, D.J. Van Harlingen, **B. Chesca**, R. Kleiner, Y. Makhlin, G. Schön, A. Shnirman, and F.K. Wilhelm, Quiet readout of superconducting flux states, *Physica Scripta* **102**, 173-177 (2002).

R.R. Schulz, **B. Chesca**, B. Goetz, C.W. Schneider, A. Schmehl, H. Bielefeldt, H. Hilgenkamp, J. Mannhart, and C.C.Tsuei, Design and Realization of an all d-wave dc π -SQUID, *App. Phys. Lett.* **76**, 912-914 (2000).

X. H. Zeng, Y. Zhang, **B. Chesca**, K. Barthel, Ya. S. Greenberg, and A. I. Braginski, Experimental study of amplitude-frequency characteristics of high-transition-temperature radio frequency superconducting quantum interference device, *J. Appl. Phys.* **88**, 6781-6787 (2000).

B. Chesca, Magnetic field dependencies of the critical current and of the resonant modes of dc SQUIDS fabricated from superconductors with $s+id_x^2-y^2$ order-parameter symmetries, *Annalen Phys. (Leipzig)* **8**, 511-522 (1999).

B. Chesca, The Effect of Thermal Noise on the I-V curves of high inductance dc SQUIDS in the presence of microwave radiation, *J. Low Temp. Phys.* **116**, 167-186 (1999).

K. Barthel, D. Koelle, **B. Chesca**, A.I. Braginski, A. Marx, R. Gross, and R. Kleiner: Transfer function and thermal noise of YBCO dc SQUIDS operated under large thermal fluctuations, *Appl. Phys. Lett.*, **74**, 2209–2211 (1999).

B. Chesca, Analytical theory of DC SQUIDS operating in the presence of thermal fluctuations, *J. Low Temp. Phys.*, **112**, 165-196 (1998).

B. Chesca, Theory of RF SQUIDS operating in the presence of large thermal fluctuations, *J. Low Temp. Phys.*, **110**, 963-1002 (1998).

B. Chesca, A three-hole RF/UHF double SQUID as a natural second-order magnetic gradiometer, *Physica C* **273**, 233-238 (1997).

B. Chesca, Theory of a UHF pumped double SQUID, *Physica C* **270**, 1-20 (1996).

B. Chesca, A thermal-activation model for intrinsic noise in RF pumped double SQUID's, *Physica C* **256**, 261-282 (1996).

B. Chesca, On the theory of the rf pumped double SQUID, *Physica C* **241**, 123-136 (1995).

B. Chesca, On the Theoretical Study of an RF-SQUID Operation Taking into Account the Noise Influence, *J. Low Temp. Phys.*, **94**, 515-538 (1994).

B. Chesca, On the theory of the symmetrical double SQUID, *Physica C* **220**, 249-257 (1994).

B. Chesca, Radio frequency pumped SQUID theory in the presence of noise, *Preprint-JINR Dubna-P17-92-99*, 1-19 (1992, in Russian).

B. Chesca, On wave diffraction: An Electromagnetic/Ultrasound analogy, *Studii si Cercetari de Fizica*, Bucharest, **44**, No.3, 201-222 (1992, in Romanian).

Edited Works: Contributions

B. Chesca, D. Koelle, and R. Kleiner, SQUID Theory, in **Superconducting Quantum Interference Devices**, Eds. John Clarke and Alex Braginski (John Wiles & Sons, Inc.), 29-92 (2004).

M. Mück, **B. Chesca**, and Y. Zhang, Radio Frequency SQUIDS and Their Applications, **NATO Advanced Study Institute (ASI) on Microwave Superconductivity**, Ed. Harold Weinstock, 505- 540 (2000).

Conference Contributions - Refereed

B. Chesca, K.Ehrhardt, M. Mößle, R. Straub, D. Koelle, R. Kleiner, A. Tsukada, Phase-sensitive evidence for a predominant d-wave pairing symmetry in the electron doped superconductor $\text{La}_{2-x}\text{Ce}_x\text{CuO}_{4-y}$, Proceedings of the **M²S HTSC Meeting**, Rio de Janeiro, Brazil; *Physica C* **408-410**, 321-323 (2004).

R.R. Schulz, **B. Chesca**, B. Goetz, C.W. Schneider, A. Schmehl, H. Bielefeldt, H. Hilgenkamp, J. Mannhart, and C.C.Tsuei, Design and Realization of an all d-wave dc π -SQUID, *Proceedings of the International Symposium on High Critical Temperature Superconductors Devices*, Naples (Italy), eds. A. Barone, F. Tafuri, 25-31 (2002).

B. Chesca and R. Kleiner, Electronic behavior of SDJ small inductance dc π -SQUIDS, Proceedings of 6th Twente Workshop on Superconductivity, *Physica C* **350**, 180-186 (2001).

B. Chesca and R. Kleiner, Order parameter phase sensitive experiments and SDJ dc SQUIDS, Proceedings of the 13 International Symposium on Superconductivity, Tokyo, *Physica C*, **357-0**, 1561-1566 (2001).

B. Goetz, R. R. Schulz, C. W. Schneider, **B. Chesca**, A. Schmehl, H. Bielefeldt, H. Hilgenkamp, J. Mannhart, Enhancement of Grain Boundary J_c by doping and realization of a High- T_c Thin Film dc π -SQUIDS, *Proc. 4th EUCAS'1999 Sitges* (Spain), Inst. Phys. Conf. Ser. No. **167**, 2000 IOP Publishing Ltd., 343-346 (2000).

H. Hilgenkamp, B. Goetz, R. R. Schulz, C. W. Schneider, **B. Chesca**, G. Hammerl, A. Schmehl, H. Bielefeldt, J. Mannhart, Understanding and Adjusting Grain Boundary Transport Properties in High- T_c superconductors, *Proceedings of the 2000 International Workshop on Superconductivity*, Shimane (Japan), 33-36 (2000).

R. R. Schulz, **B. Chesca**, B. Goetz, C. W. Schneider, A. Schmehl, H. Bielefeldt, H. Hilgenkamp, J. Mannhart and C. C. Tsuei, Realization of High- T_c dc π -SQUIDS, *Physica C* **341-348**, 1651-1654 (2000).

B. Chesca, Magnetic field dependencies of the critical current and of the resonant modes of dc SQUIDS fabricated from a 0 and a π Josephson junction in parallel,

Proceedings of the 22nd International Conference on Low Temperature Physics, LT22, July 1999, Helsinki, Finland, *Physica B* **284-288**, 2124-2126 (2000).

B. Chesca, The effect of thermal fluctuations on the operation of DC SQUIDS at 77 K - a fundamental analytical approach, Proceedings ASC 1998, Palm Spring Desert California, USA, *IEEE Trans. Appl. Supercond.*, **9**, 2955-2960 (1999).

B. Chesca, Theory of RF SQUIDS operating at 77 K, Proceedings of the 6th International Superconducting Electronics Conference ISEC'97, June 1997, Berlin, Germany, *Appl. Superconductivity* **6**, 829-835 (1999).

B. Chesca, A D-SQUID as a possible solution for approaching the classical sensitivity limit, in Proceedings of the 3rd European Conference on Applied Superconductivity, **EUCAS '97**, July 1997, Univ. of Twente, the Netherlands, *Appl. Superconductivity* eds. H. Rogalla and D.H.A.Blank (Institute of Physics Publishing, Bristol and Philadelphia), 671-674 (1998).

B. Chesca, Output signal and noise characteristics in RF pumped double SQUIDS, in Proceedings of the International Weak Superconductivity Symposium, July 1996, Smolenice, Slovak Republic, *J. Low Temp. Phys.*, **106**, 509-514 (1997).

B. Chesca, Statics, dynamics, signal and noise properties of RF pumped double SQUIDS, in Proceedings of the 21st International Conference on Low Temperature Physics, **LT21**, August 1996, Praha, Czech Republic, *Czechoslovak Journal of Physics* **46**, 2813-2814 (1996).

B. Chesca, Theoretical study of an RF-SQUID taking into account the noise influence, in Proceedings of the 8th CIMTEC, July 1994, Florence, Italy, *Advances in Science and Technology* **8**, *Superconductivity and Superconducting Materials Technologies*, Ed. P.Vincenzini, (Techna s.r.l., Faenza, Italy), 775-782 (1995);

B. Chesca, On the theory of the symmetrical double SQUID, in Proceedings of the 8th CIMTEC, July 1994, Florence, Italy, *Advances in Science and Technology* **8**, *Superconductivity and Superconducting Materials Technologies*, Ed. P.Vincenzini, (Techna s.r.l., Faenza, Italy), 769-774 (1995);

B. Chesca, Double SQUID behavior in superimposed rf and dc magnetic fields, in **Nonlinear Superconducting Devices and High-Tc Materials**, Eds. R.D.Parmentier and N.F.Pedersen, (World Scientific Publishing Co.Pte.Ltd.), 209-217 (1995).

B. Chesca, Sensitive Method for Studying the High Tc Superconducting Delicate Structure, in *Proceedings of the XXX Conference on Low Temperature Physics*, September 1994, Dubna, Russia, 136-137 (1994, in Russian).

Curriculum Vitae

University Lecturer:

Loughborough University, from 2006 until present

University Lecturer Degree in Experimental physics (**Habilitation**), June 2004

(postdoctoral academic qualification for teaching in Germany)

Solid State Physics Department, Institute of Physics, Tübingen University, Germany;

Subject: High-Tc cuprates: phase-sensitive tests of the pairing symmetry and influence of large thermal fluctuations on SQUIDs.

University Lecturer:

Solid State Physics Department, Institute of Physics, Tübingen University, Germany, 2000-2006

Postdoc,

Center for Electronic Correlations and Magnetism, Institute of Physics, Augsburg University, Germany, 1998-2000

Postdoctoral Humboldt Fellow

Forschungszentrum Jülich, Germany, 1996-1998

Doctor of Philosophy (Ph.D.) in Theoretical Physics, 1995

Frank Lab. of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Russia;

Subject: Superconducting quantum interference devices: non-linear physics and sensitive magnetic sensors.

Master of Science (M.Sc.) in Physics, 1991

University of Physics and Technological Physics, Bucharest, Romania;

Subject: Ultrasound sensors for non-destructive evaluation.