

Selected Significant Publications

G. W. Crabtree

High temperature superconductivity

Electronic and superconducting behavior

The irreversibility line of $\text{HgBa}_2\text{CuO}_4$

U. Welp, G. W. Crabtree, J. L. Wagner, D. G. Hinks, P. G. Radaelli, J. D. Jorgensen, J. F. Mitchell, and B. Dabrowski

Appl. Phys. Lett. 63, 693 (1993)

Effect of uniaxial stress on the superconducting transition in $\text{YBa}_2\text{Cu}_3\text{O}_7$

U. Welp, M. Grimsditch, S. Fleshler, W. Nessler, J. Downey, G. W. Crabtree, and J. Guimpel

Phys. Rev. Lett. 69, 2130 (1992)

High-field scaling behavior of thermodynamic and transport quantities of $\text{YBa}_2\text{Cu}_3\text{O}_7$ near the superconducting transition

U. Welp, S. Fleshler, W. K. Kwok, R. A. Klemm, V. M. Vinokur, J. Downey, B. Veal, and G. W. Crabtree

Phys. Rev. Lett. 67, 3180 (1991)

a-b anisotropy of the normal-state resistivity of untwinned $\text{YBa}_2\text{Cu}_3\text{O}_7$

U. Welp, S. Fleshler, W. K. Kwok, J. Downey, Y. Fang, G. W. Crabtree, and J. Z. Liu

Phys. Rev. B 42, 10189 (1990)

Magnetic measurements of the upper critical field of $\text{YBa}_2\text{Cu}_3\text{O}_7$ single crystals

U. Welp, W. K. Kwok, G. W. Crabtree, K. G. Vandervoort, and J. Z. Liu

Phys. Rev. Lett. 62, 1908 (1989)

Electronic behavior of oxygen-deficient $\text{YBa}_2\text{Cu}_3\text{O}_7$

W. K. Kwok, G. W. Crabtree, A. Umezawa, B. W. Veal, J. D. Jorgensen, S. K. Malik, L. J. Nowicki, A. P. Paulikas, and L. Nunez

Phys. Rev. B 37, 106 (1988)

Vortex matter

Vortex melting

R. Lortz, C. Meingast, U. Welp, W.K. Kwok, G.W. Crabtree

Crystal-lattice coupling to the vortex-melting transition in $\text{YBa}_2\text{Cu}_3\text{O}_7$

Phys. Rev. Lett. 90, 237002 (2003)

Critical points in heavy ion irradiated untwinned $\text{YBa}_2\text{Cu}_3\text{O}_7$ crystals

W. K. Kwok, R. J. Olsson, G. Karapetrov, L. M. Paulius, W. G. Moulton, D. J. Hofman, and G. W. Crabtree

Phys. Rev. Lett. 84, 3706 (2000)

Anisotropic latent heat of vortex-lattice melting in untwinned $\text{YBa}_2\text{Cu}_3\text{O}_7$

A. Schilling, R. A. Fisher, N. E. Phillips, U. Welp, W. K. Kwok, and G. W. Crabtree
Phys. Rev. Lett. 78, 4833 (1997)

Vortex physics in high-temperature superconductors

George W. Crabtree and David R. Nelson

Physics Today 50 (4), 38 (1997)

Thermodynamic evidence for a flux line lattice melting transition in YBa₂Cu₃O₇

U. Welp, J. A. Fendrich, W. K. Kwok, G. W. Crabtree, and B. W. Veal

Phys. Rev. Lett. 76, 4809 (1996)

Peak effect as a precursor to vortex lattice melting in single crystal YBa₂Cu₃O₇

W. K. Kwok, J. A. Fendrich, C. J. van der Beek, and G. W. Crabtree

Phys. Rev. Lett. 73, 2614 (1994)

Suppression of the first order vortex melting transition by intrinsic pinning in YBa₂Cu₃O₇

W. K. Kwok, J. Fendrich, U. Welp, S. Fleshler, J. Downey, and G. W. Crabtree

Phys. Rev. Lett. 72, 1088 (1994)

Vortex lattice melting in untwinned and twinned single crystals of YBa₂Cu₃O₇

W. K. Kwok, S. Fleshler, U. Welp, V. M. Vinokur, J. Downey, G. W. Crabtree, and M.

M. Miller

Phys. Rev. Lett. 69, 3370 (1992)

Vortex liquid state

An unusual phase transition to a second liquid vortex phase in the superconductor YBa₂Cu₃O₇

F. Bouquet, C. Marcenat, E. Steep, R. Calemczuk, W. K. Kwok, U. Welp, G. W. Crabtree, R. A. Fisher, N. E. Phillips, and A. Schilling

Nature 411, 448 (2001)

Vortex liquid state in an electron irradiated untwinned YBa₂Cu₃O₇ crystal

J. A. Fendrich, W. K. Kwok, J. Giapintzakis, C. J. van der Beek, V. M. Vinokur, S.

Fleshler, U. Welp, H. K. Viswanathan, and G. W. Crabtree

Phys. Rev. Lett. 74, 1210 (1995)

Vortex liquid disorder and the first order melting transition in YBa₂Cu₃O₇

W. K. Kwok, J. Fendrich, S. Fleshler, U. Welp, J. Downey, and G. W. Crabtree

Phys. Rev. Lett. 72, 1092 (1994)

Glassy vortex states: Bose glass and vortex glass

R.J. Olsson, W.K. Kwok, L.M. Paulius, A.M. Petrean, D.J. Hofman, G.W. Crabtree

Bose glass transition in columnar-defected untwinned YBa₂Cu₃O₇

Phys. Rev. B 65, 104520 (2002)

Experimental Evidence for the Vortex Glass Phase in Untwinned, Proton Irradiated YBa₂Cu₃O₇

A. M. Petrean, L. M. Paulius, W.-K. Kwok, J. A. Fendrich, and G. W. Crabtree
Phys. Rev. Lett. 84, 5852 (2000)

Evolution of the vortex phase diagram in YBa₂Cu₃O₇ with random point disorder
L. M. Paulius, W.-K. Kwok, R. J. Olsson, A. M. Petrean, V. Tobos, J. A. Fendrich, G. W. Crabtree, C. A. Burns, and S. Ferguson
Phys. Rev. B 61, R11910 (2000)

Vortex Pinning of Anisotropically Splayed Defects in YBa₂Cu₃O₇
W. K. Kwok, L. M. Paulius, V. M. Vinokur, A. M. Petrean, R. M. Ronningen, and G. W. Crabtree
Phys. Rev. Lett. 80, 600 (1998)

Effects of 1-GeV uranium ion irradiation on vortex pinning in single crystals of the high-temperature superconductor YBa₂Cu₃O₇
L. M. Paulius, J. A. Fendrich, W.-K. Kwok, A. E. Koshelev, V. M. Vinokur, G. W. Crabtree, and B. G. Glagola
Phys. Rev. B 56, 913 (1997)

Enhanced critical magnetization currents due to fast neutron irradiation in single-crystal YBa₂Cu₃O₇
A. Umezawa, G. W. Crabtree, J. Z. Liu, H. W. Weber, W. K. Kwok, L. H. Nunez, T. J. Moran, C. H. Sowers, and H. Claus
Phys. Rev. B 36, 7151 (1987)

Twin boundary pinning

Anisotropy and Lorentz-force dependence of twin-boundary pinning and its effect on flux-lattice melting in single-crystal YBa₂Cu₃O₇
Steven Fleshler, Wai-Kwong Kwok, Ulrich Welp, Valerii M. Vinokur, Morag K. Smith, John Downey, and George W. Crabtree
Phys. Rev. B 47, 14448 (1993)

Direct observation of dissipative flux motion and pinning by twin boundaries in YBa₂Cu₃O₇ single crystals
W. K. Kwok, U. Welp, G. W. Crabtree, K. G. Vandervoort, R. Hulscher, and J. Z. Liu
Phys. Rev. Lett. 64, 966 (1990)

Large anisotropic critical magnetization currents in single-crystal YBa₂Cu₃O₇
G. W. Crabtree, J. Z. Liu, A. Umezawa, W. K. Kwok, C. H. Sowers, S. K. Malik, B. W. Veal, D. J. Lam, M. B. Brodsky, and J. W. Downey
Phys. Rev. B 36, 4021 (1987)

Intrinsic pinning

Direct observation of intrinsic pinning by layered structure in single-crystal YBa₂Cu₃O₇
W. K. Kwok, U. Welp, V. M. Vinokur, S. Fleshler, J. Downey, and G. W. Crabtree
Phys. Rev. Lett. 67, 390 (1991)

Dynamic vortex states

V.K. Vlasko-Vlasov, U. Welp, V. Metlushko, G.W. Crabtree
Experimental test of the self-organized criticality of vortices in superconductors
Phys. Rev. B 69, 140504 (2004)

Numerical simulations of driven vortex systems

G. W. Crabtree, D. O. Gunter, H. G. Kaper, A. E. Koshelev, G. K. Leaf, and V. M. Vinokur
Phys. Rev. B 61, 1446 (2000)

Spatially Resolved Dynamic Correlation in the Vortex State of High Temperature Superconductors

Daniel López, W. K. Kwok, H. Safar, R. J. Olsson, A. M. Petrean, L. Paulius, and G. W. Crabtree
Phys. Rev. Lett. 82, 1277 (1999)

Static and Dynamic Vortex Phases in YBa₂Cu₃O₇

J. A. Fendrich, U. Welp, W. K. Kwok, A. E. Koshelev, G. W. Crabtree, and B. W. Veal
Phys. Rev. Lett. 77, 2073 (1996)

Structure of a moving vortex lattice

D. W. Braun, G. W. Crabtree, H. G. Kaper, A. E. Koshelev, G. K. Leaf, D. M. Levine, and V. M. Vinokur
Phys. Rev. Lett. 76, 831 (1996)

Square vortex lattice

Scanning Tunneling Microscopy Observation of a Square Abrikosov Lattice in LuNi₂B₂C

Y. De Wilde, M. Iavarone, U. Welp, V. Metlushko, A. E. Koshelev, I. Aranson, G. W. Crabtree, and P. C. Canfield
Phys. Rev. Lett. 78, 4273 (1997)

Two-band superconductivity

A. Rydh, U. Welp, A.E. Koshelev, W.K. Kwok, G.W. Crabtree, R. Brusetti, L. Lyard, T. Klein, C. Marcenat, B. Kang, K.H. Kim, K.H.P. Kim, H.S. Lee, S.I. Lee
Two-band effects in the angular dependence of H(c)₂ of MgB₂ single crystals
Phys. Rev. B 70, 132503 (2004)

A. Rydh, U. Welp, J.M. Hiller, A.E. Koshelev, W.K. Kwok, G.W. Crabtree, K.H.P. Kim, K.H. Kim, C.U. Jung, H.S. Lee, B. Kang, S.I. Lee
Surface contribution to the superconducting properties of MgB₂ single crystals
Phys. Rev. B 68, 172502 (2003)

Magnesium Diboride: Better Late than Never
Paul C. Canfield Senior Physicist and George W. Crabtree Senior Scientist
Phys. Today 56 (3), 34 (2003)

U. Welp, A. Rydh, G. Karapetrov, W. K. Kwok, and G. W. Crabtree
Ch. Marcenat and L. Paulius, T. Klein and J. Marcus, K. H. P. Kim, C. U. Jung, H.-S.
Lee, B. Kang, and S.-I. Lee
Superconducting transition and phase diagram of single-crystal MgB₂
Phys. Rev. B 67, 012505 (2003)

Two-Band Superconductivity in MgB₂
M. Iavarone, G. Karapetrov, A.E. Koshelev, W.K. Kwok, G.W. Crabtree, D.G. Hinks,
W.N. Kang, E.M. Choi, H.J. Kim, H.J. Kim, S.I. Lee
Phys. Rev. Lett. 89, 187002 (2002)

Scanning Tunneling Spectroscopy in MgB₂
G. Karapetrov, M. Iavarone, W. K. Kwok, G. W. Crabtree, and D. G. Hinks
Phys. Rev. Lett. 86, 4374 (2001)

Mesoscopic superconductivity and magnetism

Superconducting NbSe₂ nanowires and nanoribbons converted from NbSe₃
nanostructures

Y.S. Hor, U. Welp, Y. Ito, Z.L. Xiao, U. Patel, J.F. Mitchell, W.K. Kwok, G.W. Crabtree
Appl. Phys. Lett. 87, 142506 (2005)

Nanowires and nanoribbons of charge-density-wave conductor NbSe₃
Y.S. Hor, Z.L. Xiao, U. Welp, Y. Ito, J.F. Mitchell, R.W. Cook, W.K. Kwok, G.W.
Crabtree
Nano Letters 5, 397 (2005)

Tuning the architecture of mesostructures by electrodeposition
Z.L. Xiao, C.Y. Han, W.K. Kwok, H.W. Wang, U. Welp, J. Wang, G.W. Crabtree
J. Am. Chem. Soc. 126, 2316 (2004)

Superconducting transition and vortex pinning in Nb films patterned with nanoscale hole
arrays
U. Welp, Z. L. Xiao, J. S. Jiang, V. K. Vlasko-Vlasov, S. D. Bader, G. W. Crabtree, J.
Liang, H. Chik, and J. M. Xu Phys. Rev. B 66, 212507 (2002)

Vortex configurations, matching, and domain structure in large arrays of artificial pinning
centers
S.B. Field, S.S. James, J. Barentine, V. Metlushko, G. Crabtree, H. Shtrikman, B. Ilic,
S.R.J.Brueck
Phys. Rev. Lett. 88, 067003 (2002)

Decoration of Josephson vortices by pancake vortices in Bi₂Sr₂CaCu₂O₈

V.K. Vlasko-Vlasov, A. Koshelev, U. Welp, G.W. Crabtree, K. Kadowaki
Phys. Rev. B 66, 014523 (2002)

Nickel antidot arrays on anodic alumina substrates

Z.L. Xiao, C.Y. Han, U. Welp, H.H. Wang, V.K. Vlasko-Vlasov, W.K. Kwok, D.J. Miller, J.M. Hiller, R.E. Cook, G.A. Willing, G.W. Crabtree
Appl. Phys. Lett. 81, 2869 (2002)

Fabrication of alumina nanotubes and nanowires by etching porous alumina membranes

Z.L. Xiao, C.Y. Han, U. Welp, H.H. Wang, W.K. Kwok, G.A. Willing, J.M. Hiller, R.E. Cook, D.J. Miller, G.W. Crabtree
Nano Letters 2, 1293 (2002)

Organic superconductors

Weak ferromagnetism in kappa-(ET)₂Cu[N(CN)₂Cl], where (ET) is bis(ethylenedithio)tetrathiafulvalene

U. Welp, S. Fleshler, W. K. Kwok, G. W. Crabtree, K. D. Carlson, H. H. Wang, U. Geiser, J. M. Williams, and V. M. Hitsman
Phys. Rev. Lett. 69, 840 (1992)

de Haas-van Alphen studies of the organic superconductors alpha-(ET)₂NH₄Hg(SCN)₄ and kappa-(ET)₂Cu(NCS)₂[with ET = bis(ethylenedithio)-tetrathiafulvalene]

J. Wosnitzer, G. W. Crabtree, H. H. Wang, U. Geiser, J. M. Williams, and K. D. Carlson
Phys. Rev. B 45, 3018 (1992)

Angular dependence of the cyclotron effective mass in organic superconductors

J. Wosnitzer, G. W. Crabtree, H. H. Wang, K. D. Carlson, M. D. Vashon, and J. M. Williams
Phys. Rev. Lett. 67, 263 (1991)

Unusual behavior in the upper critical magnetic fields of the ambient-pressure organic superconductor kappa-(BEDT-TTF)₂Cu[N(CN)₂Br] [where BEDT-TTF represents bis(ethylenedithio)tetrathiofulvalene]

W. K. Kwok, U. Welp, K.D. Carlson, G.W. Crabtree, K.G. Vandervoort, H.H. Wang, A.M. Kini, J.M. Williams, D.L. Stupka, L.K. Montgomery, J.E. Thompson
Phys. Rev. B 42, 8686 (1990)

Superconductivity at ambient pressure in di[bis(ethylenedithio)tetrathiafulvalene]triiodide, (BEDT-TTF)₂I₃

G. W. Crabtree, K. Douglas Carlson, L. N. Hall, P. Thomas Copps, H. H. Wang, T. J. Emge, M. A. Beno, and Jack M. Williams
Phys. Rev. B 30, 2958 (1984)

Magnetic superconductors

Crystal-field effects and the magnetic properties of rare-earth rhodium borides

B. D. Dunlap, L. N. Hall, F. Behroozi, G. W. Crabtree, and D. G. Niarchos
Phys. Rev. B 29, 6244 (1984)

Observation of a first-order phase transition in single-crystal ErRh₄B₄ at H_{c2}
F. Behroozi, G. W. Crabtree, S. A. Campbell, and D. G. Hinks
Phys. Rev. B 27, 6849 (1983)

Anisotropic superconducting and magnetic properties of a single crystal of ErRh₄B₄
G. W. Crabtree, F. Behroozi, S. A. Campbell, and D. G. Hinks
Phys. Rev. Lett. 49, 1342 (1982)

Study of coexistence of ferromagnetism and superconductivity in single-crystal ErRh₄B₄
S. K. Sinha, G. W. Crabtree, D. G. Hinks, and H. Mook
Phys. Rev. Lett. 48, 950 (1982)

Electronic structure of correlated electron metals

Narrow band transition metals

Anisotropy of the Fermi surface, Fermi velocity, many-body enhancement, and
superconducting energy gap in Nb

G. W. Crabtree, D. H. Dye, D. P. Karim, S. A. Campbell, and J. B. Ketterson
Phys. Rev. B 35, 1728 (1987)

Anisotropy of the many-body enhancements on the Fermi surface of Pd
W. Joss and G. W. Crabtree
Phys. Rev. B 30, 5646 (1984)

Absence of magnetic field dependence of the cyclotron effective masses of electrons on
the Fermi surface of Pd
W. Joss, L. N. Hall, G. W. Crabtree, and J. J. Vuillemin
Phys. Rev. B 30, 5637 (1984)

Fermi surface and many-body enhancement in Pd
D. H. Dye, S. A. Campbell, G. W. Crabtree, J. B. Ketterson, N. B. Sandesara, and J. J.
Vuillemin
Phys. Rev. B 23, 462 (1981)

Anisotropic many-body effects in the quasiparticle velocity of Nb
G. W. Crabtree, D. H. Dye, D. P. Karim, D. D. Koelling, and J. B. Ketterson
Phys. Rev. Lett. 42, 390 (1979)

Narrow band 4f and 5f metals

Shape of the upper-critical-field curves in URu₂Si₂ Evidence for anisotropic pairing
W. K. Kwok, L. E. DeLong, G. W. Crabtree, D. G. Hinks, and Robert Joynt
Phys. Rev. B 41, 11649 (1990)

Magnetic properties and Fermi surface of antiferromagnetic SmCu₆
Y. Onuki, A. Umezawa, W.K. Kwok, G.W. Crabtree, M. Nishihara, K. Ina, T.
Yamazaki, T. Omi, T. Komatsubara, K. Maezawa, S. Wakabayashi, S. Takayanage. N.
Wada
Phys. Rev. B 41, 568 (1990)

High-field magnetoresistance and de Haas--van Alphen effect in antiferromagnetic PrB₆ and NdB₆

Y. Onuki, A. Umezawa, W. K. Kwok, G. W. Crabtree, M. Nishihara, T. Yamazaki, T. Omi, and T. Komatsubara
Phys. Rev. B 40, 11195 (1989)

Band-narrowing effects in URh₃B_x

B. D. Dunlap, G. W. Crabtree, J. D. Jorgensen, H. A. Kierstead, D. D. Koelling, W. K. Kwok, D. J. Lam, S. K. Malik, A. W. Mitchell, and S. C. Strite
Phys. Rev. B 39, 5640 (1989)

Observation of the magnetic field dependence of the cyclotron mass in the Kondo lattice CeB₆

W. Joss, J. M. van Ruitenbeek, G. W. Crabtree, J. L. Tholence, A. P. J. van Deursen, and Z. Fisk
Phys. Rev. Lett. 59, 1609 (1987)

Fermi surface study of CeSb

H. Aoki, G. W. Crabtree, W. Joss, and F. Hulliger
J. Appl. Phys. 57, 3033 (1985)

f-electron hybridization and heavy-fermion compounds

D. D. Koelling, B. D. Dunlap, and G. W. Crabtree
Phys. Rev. B 31, 4966 (1985)

de Haas--van Alphen effect and Fermi surface of lutetium

W. R. Johanson, G. W. Crabtree, and F. A. Schmidt
Phys. Rev. B 29, 2673 (1984)

de Haas--van Alphen measurements in the ferromagnetic compounds U₃P₄ and U₃As₄

Z. Henkie, W. R. Johanson, A. J. Arko, G. W. Crabtree, and C. Bazan
Phys. Rev. B 28, 4198 (1983)

Fermi-surface measurements of mixed-valent CeSn₃

W. R. Johanson, G. W. Crabtree, A. S. Edelstein, and O. D. McMasters
Phys. Rev. Lett. 46, 504 (1981)

de Haas--van Alphen effect and the band structure of URh₃

A. J. Arko, M. B. Brodsky, G. W. Crabtree, D. Karim, D. D. Koelling, L. R. Windmiller, and J. B. Ketterson
Phys. Rev. B 12, 4102 (1975)