

Prof. Dr. Ir. MICHEL VAN VEENENDAAL

Name: Michel A. van Veenendaal
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Northern Illinois University
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Present Rank: Associate Professor at the Department of Physics, Northern Illinois University.

EDUCATIONAL BACKGROUND

1990-1994

RIJKSUNIVERSITEIT GRONINGEN (RUG)

Laboratory of Solid State Physics, Nijenborgh 4, 9747 AG, Groningen, The Netherlands.

RUG was founded in 1614, which makes it the second oldest university in the Netherlands. It has 22,000 students and 5,000 employees.

Degree: Doctor (Dr. is equivalent to Ph.D.)

- The thesis work was done in the group of Prof. Sawatzky and involved the study of transition metal oxides, high- T_c materials, and C_{60} by means of photoelectron spectroscopy and X-ray absorption.
- Wrote significant papers on the extension of the Anderson impurity model, which strongly changed the concepts of core-level spectroscopy in strongly correlated materials.
- Gave lectures to undergraduate students.

1986-1990

DELFT UNIVERSITY OF TECHNOLOGY

Department of Applied Physics, Lorentzweg 1, 2628 CJ Delft, The Netherlands.

Delft is the leading University of Technology in the Netherlands with 13,000 students

Degree: Ingenieur (Ir. equivalent to M.Sc.)

- My graduation work involved the study of the temperature dependence of the chemical potential of high- T_c superconductors under the supervision of Dr. Van der Marel. This work was done in the group of Prof. Mooij.
- Taught summer courses to first year students.

PROFESSIONAL EXPERIENCE

2001-present

NORTHERN ILLINOIS UNIVERSITY (NIU)

Department of Physics, Northern Illinois University, DeKalb, IL 60115, USA.

NIU is a comprehensive teaching and research institution with a student enrollment of over 23,000.

Title: Associate Professor

- Associate professorship in Condensed matter theory.
- Laid the foundations for a joint NIU and APS Theory Program.
- Deputy Director of the Laboratory for Nanoscience, Engineering, and Technology.

2001-present

ARGONNE NATIONAL LABORATORY

9700 S. Cass Avenue, Argonne, IL 60439.

Argonne is one of the Department of Energy's largest research centers

Title: Resident Associate

Prof. Dr. Ir. MICHEL VAN VEENENDAAL

- Resident Associate in the Theory Group of the Materials Science Division led by Dr. Mike Norman and at the Advanced Photon Source.

1998-2001

PHILIPS RESEARCH LABORATORIES EINDHOVEN (PRLE)

Prof. Holstlaan 4, 5656 AA Eindhoven, The Netherlands.

PRLE is the largest research laboratory in the Netherlands, where the majority of the research for Royal Philips Electronics is done.

Title: Senior Scientist

- Research project on aberration correction in (scanning) transmission electron microscopes.
- Project leader for the development of a new focused ion beam column. Research subjects included Monte-Carlo studies of the interactions between particles in a beam and lens optimizations.
- Project leader on methodologies in X-ray diffraction.

1997-1998

NORTHERN ILLINOIS UNIVERSITY (NIU)

Department of Physics, Northern Illinois University, DeKalb, IL 60115, USA.

Title: Research Associate

- Collaborated with Prof. Fedro in the theoretical effort as part of a grant on colossal-magneto-resistance (CMR) materials, funded by the Office of Naval Research. This work included collaborations with researchers from NIU and Argonne National Laboratory.
- Published two Physical Review papers on magnetic structure and charge-order of the manganites.

1994-1997

EUROPEAN SYNCHROTRON RADIATION FACILITY (ESRF)

Rue de Martyrs, Grenoble, France.

The ESRF is a multinational research laboratory supported by 17 European countries and operates an electron-storage ring as a powerful source of X-rays.

Title: Research Associate

- Arranged financial support for position from the European Union.
- Interpreted results of state-of-the-art X-ray spectroscopy experiments.
- The research involved the study of the interactions of X-rays with a broad range of materials, such as graphite, strongly correlated compounds with transition-metal and rare-earth ions. Techniques included X-ray scattering and absorption and Magnetic X-ray dichroism.
- The work was done in the group of Dr. Altarelli (now led by Dr. Carra) and involved many collaborations with experimentalists working at the synchrotron.
- Wrote a substantial number of important papers in the field of X-ray spectroscopy, including several Physical Review Letters.
- Supervised and directed Ph.D. and undergraduate students.

B. PUBLICATIONS

BOOKS:

The Theory of Core-Level Line Shapes Beyond the Impurity Limit

M. van Veenendaal, Ponsen & Looijen B.V., Wageningen, The Netherlands, ISBN 90-9007626-1. Limited printing (400 copies) of my dissertation.

SUBMITTED TO REFEREED JOURNALS:

Theory of indirect resonant inelastic x-ray scattering

J. van den Brink and M. van Veenendaal, in preparation for Phys. Rev. Lett.

Soft resonant x-ray scattering study of magnetic and orbital correlations in a manganite near half-doping

K. J. Thomas, J. P. Hill, S. Grenier, Y.-J. Kim, Y. Tokura, D. McMorrow, and M. van Veenendaal, in preparation for Phys. Rev. Lett.

X-ray Absorption Study of Local Magnetic Moments in the Amorphous Magnetic Semiconductor $a\text{-Gd}_x\text{Si}_{1-x}$

F. Hellman, J.W. Freeland, P. Ryan, D. Haskel, and R. Winarski, M. van Veenendaal, and R. Wu, in preparation for submission to Phys. Rev. B

Polarized Resonant Inelastic X-ray Scattering and the Excitation Spectrum of NaV_2O_5

M. van Veenendaal and A. J. Fedro, submitted to Phys. Rev. B (7/9/03, manuscript LD9406BJ)

Comment on “Correlation Effects in Resonant Inelastic X-ray Scattering of NaV_2O_5 ”

M. van Veenendaal and A. J. Fedro, submitted to Phys. Rev. Lett. (6/2/03, manuscript LFK892)

REFEREED JOURNALS:

26. Combined analytical and Monte-Carlo approach to statistical Coulomb blurring.

M. van Veenendaal, J. of Appl. Phys. **93**, 6381 (2003).

25. Resonant x-ray magnetic scattering at nonmagnetic ions

M. van Veenendaal, Phys. Rev. B **67**, 134112 (2003).

24. Transmission of through-the-lens Auger spectroscopy in an electron microscope.

M. van Veenendaal and S. den Hartog, Ultramicroscopy **90**, 113 (2002).

23. Charge order and the metal-insulator transitions in $A_{1/2}A'_{1/2}\text{MnO}_3$.

M. van Veenendaal and A. J. Fedro, Phys. Rev. B **59**, 15 056 (1999).

22. Magnetic circular dichroism in resonant Raman scattering in the perpendicular geometry at the L -edge of $3d$ transition-metal systems.

L. Braichovich, G. van der Laan, G. Ghiringhelli, A. Tagliaferri, M. van Veenendaal, N. B. Brookes, M. M. Chervinskii, C. Dallera, B. Michelis, and H. A. Dürr, Phys. Rev. Lett. **82**, 1566 (1999).

21. Influence of double occupancy and lattice distortions on the magnetic phase diagram of $A_{1/2}A'_{1/2}\text{MnO}_3$

M. van Veenendaal and A. J. Fedro, Phys. Rev. B **59**, 1285 (1999).

20. X-ray absorption and resonant inelastic X-ray scattering in the rare earths.

M. van Veenendaal and R. Benoist, Phys. Rev. B **58**, 3741 (1998).

19. Branching ratios of the circular dichroism at rare-earth L_{23} edges.

M. van Veenendaal, J. B. Goedkoop, and B. T. Thole, J. Elec. Spec. **86**, 151 (1997).

18. Soft X-ray fluorescence yield XMCD sum rules.

J. B. Goedkoop, N. B. Brookes, M. van Veenendaal, and B. T. Thole, J. Elec. Spec. **86**, 143 (1997).

17. Comment on “Spin polarization and magnetic circular dichroism in photoemission from the 2*p* core level of ferromagnetic Ni”.

N. Manini, M. van Veenendaal, and M. Altarelli, Phys. Rev. Lett. **79**, 2594 (1997).

16. Resonant soft X-ray inelastic scattering from Gd in the Gd₃Ga₅O₁₂ garnet with excitation across the M₅ edge.

C. Dallera, L. Braichovich, G. Ghiringhelli, M. van Veenendaal, J. B. Goedkoop, and N. B. Brookes, Phys. Rev. B **56**, 1279 (1997).

15. X-ray L_{2,3} resonant Raman scattering from NiO: spin flip and intermediate-state relaxation.

L. Braichovich, C. Dallera, G. Ghiringhelli, N. B. Brookes, J. B. Goedkoop, and M. A. van Veenendaal, Phys. Rev. B **55**, R15 989 (1997).

14. Phase transition in LiVO₂ studied by near-edge X-ray-absorption spectroscopy.

H. F. Pen, L.-H. Tjeng, E. Pellegrin, F. M. F. de Groot, G. A. Sawatzky, and M. A. van Veenendaal, C.-T. Chen, Phys. Rev. B **55**, 15 500 (1997).

13. Excitons and resonant inelastic X-ray scattering in graphite.

M. van Veenendaal and P. Carra, Phys. Rev. Lett. **78**, 2839 (1997).

12. Branching ratios of the circular dichroism at rare earth L₂₃ edges.

M. van Veenendaal, J. B. Goedkoop, and B. T. Thole, Phys. Rev. Lett. **78**, 1162 (1997).

11. Deconvolution of lifetime broadening at rare-earth L_{III} edges compared to resonant inelastic X-ray scattering measurements.

P. W. Loeffen, R. F. Pettifer, S. Mullender, M. A. van Veenendaal, J. Rohler, and D. S. Silvia, Phys. Rev. B **54**, 14 877 (1996).

10. X-ray resonant Raman scattering in the rare earths.

M. van Veenendaal, P. Carra, and B. T. Thole, Phys. Rev. B **54**, 16 010 (1996).

9. Polarized X-ray fluorescence as a probe of ground state properties.

M. van Veenendaal, J. B. Goedkoop, and B. T. Thole, Phys. Rev. Lett. **77**, 1508 (1996).

8. Influence of superexchange on Ni 2*p* X-ray-absorption spectroscopy in NiO.

M. A. van Veenendaal, D. Alders, and G. A. Sawatzky, Phys. Rev. B **51**, 13 966 (1996).

7. Doping dependence of Ni 2*p* X-ray-absorption spectra of M_xNi_{1-x}O (M=Li, Na).

M. A. van Veenendaal and G. A. Sawatzky, Phys. Rev. B **50**, 11 326 (1994).

6. Intersite interactions in Cu L-edge XPS, XAS, and XES of doped and undoped Cu compounds.

M. van Veenendaal and G. A. Sawatzky, Phys. Rev. B **49**, 3473 (1994).

5. Electronic structure of Bi₂Sr₂Ca_{1-x}Y_xCu₂O_{8+δ}: Cu 2*p* X-ray-photoelectron spectra and occupied and unoccupied low-energy states.

M. A. van Veenendaal, G. A. Sawatzky, and W. A. Groen, Phys. Rev. B **49**, 1407 (1994).

4. Strong nonlocal contributions to Cu 2p photoelectron spectroscopy.

M. A. van Veenendaal, H. Eskes, and G. A. Sawatzky, Phys. Rev. B **47**, 11462 (1993).

3. Nonlocal screening effects in 2p X-ray photoemission spectroscopy core-level line shapes of transition metal compounds.

M. A. van Veenendaal and G. A. Sawatzky, Phys. Rev. Lett. **70**, 2459 (1993).

2. Doping dependence of the chemical potential in $\text{Bi}_2\text{Sr}_2\text{Ca}_{1-x}\text{Y}_x\text{Cu}_2\text{O}_{8+\delta}$.

M. A. van Veenendaal, R. Schlatmann, G. A. Sawatzky, and W. A. Groen, Phys. Rev. B **47**, 446 (1993).

1. Band gap, excitons, and Coulomb interaction in solid C_{60} .

R. W. Lof, M. A. van Veenendaal, B. Koopman, H. T. Jonkman, and G. A. Sawatzky, Phys. Rev. Lett. **68**, 3924 (1992).

CONFERENCE PROCEEDINGS (REFEREED TO LIGHTLY REFEREED):

4. Strong final state effects in L_{23} XMCD of ionic rare-earth materials.

J. B. Goedkoop, A. Rogalev, M. Rogaleva, C. Neumann, J. Goulon, M. van Veenendaal, B. T. Thole, J. de Physique IV (France), Vol.7 **C2**, 415 (1997).

3. Band gap, excitons and Coulomb interactions of solid C_{60} .

R. W. Lof, M. A. van Veenendaal, H. T. Jonkman, and G. A. Sawatzky, J. Elec. Spec. **72**, 83 (1995).

2. Correlation effects in solid C_{60} .

R. W. Lof, M. A. van Veenendaal, B. Koopman, A. Heessels, H. T. Jonkman, and G. A. Sawatzky, Int. J. Mod. Phys. **6**, 3915 (1992).

1. Temperature dependence of the chemical potential of high T_c superconductors.

G. Rietveld, M. A. van Veenendaal, D. van der Marel, and J. E. Mooij, Physica B **165-166**, 1605 (1990).

NON-REFEREED JOURNALS:

1. K-edge resonant inelastic X-ray scattering in graphite.

P. Carra and M. van Veenendaal, ESRF Newsletter **29**, 20 (1997).

PAPERS READ AT PROFESSIONAL MEETINGS (SINCE 2002)

7. Resonant Elastic and Inelastic Soft X-ray Scattering.

M. van Veenendaal, invited seminar given at Brookhaven National Laboratory, July 2003.

6. Polarized Resonant Inelastic X-ray Scattering and the Excitation Spectra of NaV_2O_5 .

M. van Veenendaal, invited talk given at the Magnetic Round Table series at the Advanced Photon Source, Argonne National Laboratory, April 2003.

5. Inelastic X-ray Scattering Program, a ANL-UofC Theory Institute Initiative.

M. van Veenendaal, invited seminar given at the University of Chicago, Jan. 2003.

4. Dynamic Jahn-Teller effects in photoinduced magnetism in molecule-based magnets.

Prof. Dr. Ir. MICHEL VAN VEENENDAAL

M. van Veenendaal, invited talk given at CARS-CAT at the Advanced Photon Source, Argonne National Laboratory, May 2002.

3. Introduction to magnetic round-table meetings.

M. van Veenendaal and K. Attenkofer, introductory seminar given at the Advanced Photon Source, Argonne National Laboratory, Feb. 2002.

2. Resonant x-ray magnetic scattering at nonmagnetic ions.

M. van Veenendaal, invited seminar presented at the Advanced Photon Source, Argonne National Laboratory, Feb. 2002.

1. Resonant x-ray magnetic scattering at nonmagnetic ions.

M. van Veenendaal, Colloquium given at the Physics Department, Northern Illinois University, Feb. 2002.

OTHER PRESENTATIONS

1. Laboratory for NanoScience, Engineering, and Technology (LNSET).

M. van Veenendaal, presentation given at the Chicago Technology Leadership Forum of the Union League Club of Chicago, Nov. 2002.

POSTERS PRESENTED AT PROFESSIONAL MEETINGS (SINCE 2002)

1. Study of Electronic Structure by a Sub-Nanometer Probe

B. D. Armstrong, Y. Ito, and M. van Veenendaal, Poster presented at the DOE Nanoscale Science Research Centers Workshop, Washington, D.C., Feb. 26-28, 2003

Brandon Armstrong was one of the ten undergraduate students chosen by Argonne National Laboratory to represent its research in nanomaterials at the Department of Energy. The work was initiated under the LAS Undergraduate Research Apprenticeship Program and conducted jointly at NIU (under the supervision of Prof. Ito).

C. GRANTS, FELLOWSHIPS, AND LEAVES OF ABSENCE

GRANTS AWARDED

Summary of awarded grants by the Department of Energy, the University of Chicago/Argonne National Laboratory and the Research Corporation:

Amount awarded (DOE, UofC/ANL, Research Corporation, NIU Graduate School): \$464,163 (till 2003)

Expected future grants:

Continuation of UofC/ANL award: \$40,541 (to be awarded in 2004)

Total (estimated) award amount (UofC/ANL, Research Corporation, DOE): \$504,724

2003

Nanoscale optics for EUV lithography

Prof. Dr. Ir. MICHEL VAN VEENENDAAL

PI's Kazimierz Gofron, Clyde Kimball, Michael Haji-Sheik, and Michel van Veenendaal, submitted to the Office of the NIU's Vice President for Research and Dean of the Graduate School Rathindra Bose. This project requests support for a student project to develop new lithographic techniques for extreme ultraviolet lithography. This project involves the Departments of Physics and Electrical Engineering. Award amount: \$20,000.

Polarized x-rays as a probe of spin polarization and interface and confinement effects: Theoretical approach

PI M. van Veenendaal to the general call for proposals of Basic Energy Sciences of the Department of Energy. Award amount \$330,000.

Theoretical support for synchrotron-related works.

PI M. van Veenendaal. Project in the Theory Group of the Materials Science Division at Argonne National Laboratory led by Mike Norman. Award amount: \$17,811.

Research on the interpretation of X-ray spectroscopy

PI M. van Veenendaal, awarded by the Advanced Photon Source at Argonne National Laboratory. Award amount \$40,541. This award will be extended into a second year. The other half is paid for by LNSSET.

2002

Grant RI0947 Dynamic Jahn-Teller effects in photoinduced magnetism in molecule-based magnets.

PI M. van Veenendaal, funded by Research Innovation Awards program of the Research Corporation. The Research Corporation was founded in 1912 by F.G. Cottrell and is devoted to the advancement of science. Fixed award amount of \$35,000.

Theoretical support for synchrotron-related works.

PI M. van Veenendaal. Project in the Theory Group of the Materials Science Division at Argonne National Laboratory led by Mike Norman. Award amount: \$17,811.

Grants awarded within Argonne National Laboratory

2003

White Paper: Resonant Inelastic Scattering on Strongly Correlated Systems

PI's M. van Veenendaal, M. R. Norman, J. P. Hill, and Y.-K. Kim to the Advanced Photon Source. The proposal has been awarded. The postdoc will be hired through the APS, but will work under my supervision.

Budget for the Magnetic Round Table seminar series.

PI's M. van Veenendaal and K. Attenkofer. Funds to organize a monthly seminar series on studies of magnetism using synchrotron radiation. Supported by the Advanced Photon Source, Argonne National Laboratory. Internal ANL award amount \$2,500.

2002

Amenities for the Magnetic Round Table meetings from Argonne National Laboratory.

PI's M. van Veenendaal and K. Attenkofer. Internal ANL award amount \$500.

AWARDS

2002-2007 Research Innovation Award of the Research Corporation
1994-1996 Human Capital and Mobility fellow of the European Union.

PROFESSIONAL SERVICE

A. PROFESSIONALLY SIGNIFICANT ACHIEVEMENTS

Referee for Physical Review Letters, Physical Review B, and Applied Physics Letters.

Reviewer of proposals for Basic Energy Sciences, Department of Energy.

Member of Sigma Xi.

Member of the American Physical Society.

Resident Associate at Argonne National Laboratory.

Member of the International Advisory Board for the 2004 International Conference on Inelastic X-ray Scattering

I am one of the founders of the start-up nanotechnology company Northern Illinois Nanotech, together with Michael Haji-Sheikh (EE), Kazimierz Gofron (APS/ANL), and Clyde Kimball (Physics). Northern Illinois Nanotech will work on the development of UV-lithography and sensors. Northern Illinois Nanotech was founded in 2003.

Member of the Scientific Advisory Board of the Inelastic X-ray Scattering Collaborative Access Team (IXS-CAT) at the Advanced Photon Source, Argonne National Laboratory. The Directors of the IXS-CAT are Dr. E. E. Alp (APS/ANL) and Dr. J. Hill (Brookhaven National Laboratory).