

CURRICULUM VITAE

PERSONALIA

NAME Joachim Benedictus Moortgat
WORK ADDRESS Reservoir Engineering Research Institute (RERI)
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BORN June 15, 1977 in Cologne, Germany
NATIONALITY Belgian (US permanent resident)

CURRENT AFFILIATION

NOV. 2008 – Postdoctoral researcher, Reservoir Engineering Research Institute (RERI), Palo Alto, CA. Collaborating with Prof. Abbas Firoozabadi on compositional modeling of multi-phase flow in oil, gas and water reservoirs with applications to CO₂ injection to enhance oil recovery, and carbon sequestration in saline aquifers.

JOB HISTORY

FEB. 2006 – Postdoctoral fellow, Department of Physics & Astronomy, University of Rochester, NY.
SEPT. 2008 Collaborating with Profs. Eric Blackman and Chuang Ren on NASA grant:
Understanding Poynting flux dominated outflows in nature's most powerful engines.

EDUCATION & QUALIFICATIONS

FEB. 2007 *Maitre de conférences* qualification, *National des Universités*, CNU, France.
NOV. 2001– PhD in Astrophysics, Department of Astrophysics, Radboud University Nijmegen, the
FEB. 2006 Netherlands (NL).
Title: *General Relativistic Plasma Dynamics*,
Advisor: Prof. Jan Kuijpers,
Defense: May 8th 2006.

1997–2001 – MSc in Physics, Institute of Theoretical Physics (ITF), Utrecht University, NL,
Thesis advisor: Nobel Laureate Prof. Gerard 't Hooft.
– MSc in Astronomy, Utrecht Astronomy Institute (SIU), Utrecht University,
Thesis advisor: Prof. Jan Kuijpers.

1996–1997 – Propedeuse degree (1st year university) in Geophysics, Utrecht University.
– Propedeuse in Physics, Astronomy and MFO (Meteorology and Physical Oceanography),
Utrecht University.

1995 Christelijk Gymnasium (comparable to the British A-level examination), Utrecht.

PUBLICATIONS

REFEREED

- 1 – *Compositional Modeling of Three-Phase Flow with Gravity using Higher-Order Finite Element Methods and Applications to CO₂ Injection*,
J. Moortgat, S. Sun & A. Firoozabadi,
Water Resources Research, **47**, Number W05511 (2011).
- 2 – *Higher-Order Compositional Modeling With Fickian Diffusion in Unstructured and Anisotropic Media*,
J. Moortgat & A. Firoozabadi,
Advances in Water Resources, **33**, Issue 9, pp. 951–968 (2010).
- 3 – *Three-Phase Compositional Modeling of CO₂ Injection By Higher-Order Finite Element Methods With CPA equation of state*,
J. Moortgat, Z. Li & A. Firoozabadi,
revision submitted to Water Resources Research
- 4 – *A Detailed Experimental and Numerical Study of Gravitational Effects on CO₂ Enhanced Recovery*,
J. Moortgat, A. Firoozabadi, Z. Li & R. Esposito,
(SPE-135563-MS), accepted to appear in SPE J.
- 5 – *A New Approach to Compositional Modeling of CO₂ Injection in Fractured Media, Compared to Experimental Data*,
J. Moortgat, A. Firoozabadi & M. Moravvej Farshi,
SPE-124918-MS, to be submitted.
- 6 – *Geographic Axes and the Persistence of Cultural Diversity*,
D. Laitin, M. Moortgat & A. L. Robinson,
Proceedings of the National Academy of Sciences, accepted to appear 2012.
- 7 – *Nonlinear Interactions between Gravitational Radiation and Modified Alfvén Modes in Astrophysical Dusty Plasmas*,
M. Forsberg, G. Brodin, M. Marklund, P. K. Shukla & J. Moortgat,
Physical Review D **74**, pp. 064014 (2006).
- 8 – *Scalar Perturbations in Two-Temperature Cosmological Plasmas*,
J. Moortgat & M. Marklund,
Monthly Notices of the Royal Astronomical Society, **369**, Issue 4, pp. 1813–1821 (2006).
- 9 – *Scattering of Magnetosonic Waves in a Relativistic and Anisotropic Magnetized Plasma*,
J. Moortgat & J. Kuijpers,
Monthly Notices of the Royal Astronomical Society, **368**, Issue 3, pp. 1110–1122 (2006).
- 10 – *Gravitational Waves in Magnetized Relativistic Plasmas*,
J. Moortgat & J. Kuijpers,
Physical Review D **70**, 023001 (2004).
- 11 – *Gravitational and Magnetosonic Waves in Gamma-Ray Bursts*,
J. Moortgat & J. Kuijpers,
Astronomy and Astrophysics, **402**, p.905-911 (2003).

PROCEEDINGS

- 1 – *Particle-In-Cell Simulations of Fast Collisionless Reconnection in Gamma-Ray Burst Outflows*,
J. Moortgat, E. G. Blackman, C. Ren, X. Kong & R. Yan,
Research and Training Network (*GRB: an enigma and a tool*) meeting, 19-23 March, 2007,
Amsterdam, the Netherlands.

- 2 – *Indirect Visibility of Gravitational Waves in Magnetohydrodynamic Plasmas*,
J. Moortgat & J. Kuijpers,
XXII Texas Symposium on Relativistic Astrophysics, December 2004, Stanford.
- 3 – *Gravitational Wave Interactions with Magnetized Plasmas*,
J. Moortgat & J. Kuijpers,
NATO Advanced Study Institute on the Electromagnetic Spectrum of Neutron Stars, June
2004, Marmaris, Turkey.
- 4 – *Plasma Waves Driven by a Gravitational Wave*,
J. Moortgat & J. Kuijpers,
13th Workshop of the Astro-Plasma-Physics TMR Network, Feb. 2002, Tromsø, Norway.
General Relativistic Plasma Dynamics,¹ Feb. 2006.
- PHD THESIS *Watching Gravitational Waves*, Utrecht University, 2001.
- MSc THESIS

SCIENTIFIC PRESENTATIONS

- 2012 2 Presentations at the RERI annual JIP workshop, May. 10th, Palo Alto, CA.
- 2011 SPE Reservoir Simulation Symposium, Feb. 22nd, Woodlands, Texas.
- 2010 SPE Annual Technical Conference and Exhibition, Sept. 21st, Florence, Italy.
2 Presentations at the RERI annual JIP workshop, May. 10th, Palo Alto, CA.
Colloquium, Environmental Hydrogeology Group, Jan. 22nd, Utrecht University, NL.
- 2009 SPE Annual Technical Conference and Exhibition, Oct. 6th, New Orleans, Louisiana.
2 Presentations at the RERI annual workshop, May. 11th, Palo Alto, CA.
- 2007 Invited colloquium, Harvard-Smithsonian Center for Astrophysics, Dec. 5th, Cambridge.
Poster & award talk, *GRBs: an Enigma and a Tool*, March 23rd, Amsterdam, NL.
- 2005 Invited colloquium, Department of Physics, Nov., Umeå University, Sweden.
Invited colloquium, Department of Physics & Astronomy, Oct., University of Rochester.
- 2004 Several informal presentations during stay at Caltech, Oct.–Dec., Pasadena, CA.
Invited review presentation and a contributed presentation at the *Workshop on General
Relativistic Plasma Physics*, Sept., Thessaloniki, Greece.
- 2003 Presentation at the IAU General Assembly, July, Sydney, Australia.
- 2002 Presentation at the NATO-ASI summer school on *Accretion Disks, Jets and High Energy
Phenomena in Astrophysics*, July-Aug., Les Houches, France.
- 2001 Invited colloquia in Italy on the basis of MSc thesis (Sept.) at:
- Institute of Physics, Bologna,
- Istituto Internazionale di Fisica Nucleare (INFN) in Ferrara,
- Legnaro Laboratories, Padua.
- 2002–2005 14 presentations at all 5 Dutch astronomy institutes and at national conferences, workshops
and summer schools.

¹ PhD thesis e-print at: http://webdoc.ubn.ru.nl/mono/m/moortgat_j/generepld.pdf
National press coverage in a.o. the science column of the national daily newspaper *de Volkskrant*:
http://allesoversterrenkunde.nl/cgi-bin/scripts/db.cgi?ID=495&view_records=1
- Dutch Department of Education, Culture and Science (OCW):
<http://www.kennislink.nl/publicaties/zwaartekrachtsgolven-indirect-zichtbaar>
- Weekly Scientist: <http://www.weeklyscientist.com/ws/articles/gwaves.htm>

TEACHING

- 2006–2008 **University of Rochester**, 4 guest lectures on Relativity and Black Holes.
2001–2005 **Radboud University Nijmegen** (teaching constitutes 25% of a PhD position in NL).
2004–2005 Extra thesis advisor of 2 master students.
Developed an on-line learning environment for 4 courses on Classical Mechanics, Electro- and Magnetodynamics.
- FALL 2003 *Caleidoscope* (TA). Bachelor course by Prof. Jan Kuijpers on relativity, lensing, space sailing and astero-seismology.
Black Holes and Active Galactic Nuclei (TA). Master course by Prof. Heino Falcke.
- WINTER 2002 *Black Holes and Active Galactic Nuclei*. **Additional contributions:** Created the set of (programming) tutorials for this new course and provided 2 guest lectures.
- FALL 2002 *Caleidoscope*. **Additional contributions:** Development of web-based course materials to replace the traditional paper handouts.
- 1998–2000 **Utrecht University** (teaching assistant positions).
SUMMER 2000 *Physics I* (lab). **Additional contributions:** Revised the content of the physics lab assignments for the new Bachelor-Masters program and developed a web-interface.
- SPRING 2000 *Physics I*. **Additional contributions:** Updated the course to be more interactive and added a tutorial on how to write and orally present proposals for an experiment. Discussed and graded the proposals, the experimental results and final reports.
- FALL 1999 *Electronics I*. freshmen course.
SPRING 1999 *Programming in LabView*. **Additional contributions:** Redesigned an existing physics course to teach Natural Sciences, Economy and Management students to write LabView programs to control apparatus used in physical experiments.
- SPRING 1999 *Physics I*. Supervised lab assignments on topics such as the decay of radioactive substances, photo-electric effects and heat transport and graded the reports.
- FALL 1998 2 courses on *Measurements in Physics* and *Electronics*.

INDUSTRY

- 2010 – Schlumberger/KOC: development of improved simulator and modeling of volatile oil and gas condensate in fractured reservoirs. Final results presented at KOC, Oct. 24th, Kuwait.
– Pemex: design and modeling of CO₂ injection pilot project in an off-shore fractured reservoir. Final results presented at Pemex, Aug. 17th, Ciudad del Carmen, Mexico.
– ConocoPhillips: development of 3-phase compositional simulator for water-gas-oil problems.
- 2009 – Pemex: modeling of EOR through nitrogen and CO₂ injection in fractured reservoirs. Results presented at Pemex, May 17th, Ciudad del Carmen, Mexico.

AWARDS & GRANTS

- 2007 Best Poster Award (award presentation and contribution to refereed proceedings), RTN *GRB's: an enigma and a tool*, March 23nd, Amsterdam, the Netherlands.
- 2004 Stipend from Caltech for a Oct.–Dec. stay at the Theoretical Astrophysics including Relativity (TAPIR) group, CIT, Pasadena.
- 2002 Netherlands Research School for Astronomy, NOVA, PhD fellowship.
- 2002–2005 Various travel grants for international conferences and summer schools awarded by the private Dutch Leids Kerkhoven-Bosscha Fund.

GENERAL PUBLIC LECTURES & OUTREACH

2002–2005

Radboud University Nijmegen

- Lecture on *Gravitational Lensing* on the occasion of the World Year of Physics,
- Several lectures for the Dutch Society for Meteorology and Astronomy,
- General *Studium Generale* lecture for an audience of 250 laymen,
- Appearance on regional television on the occasion of a lunar eclipse,
- Master class on *Gravitational Lensing* for high school students.

1996–2000

Utrecht University: Various promotional activities each year (such as lab demonstrations) for the Faculty of Physics and Astronomy to attract new students.

ORGANIZATION

2006–2007

Initiated and organized a weekly journal club at the Dept. of Astrophysics, Rochester.

2002–2005

Member of the LOC/NOC: the combined National Education Committee and the Netherlands Research School for Astronomy (NOVA) Education Committee.

2004

Principal organizer of the Dutch Astrophysics Days workshop.

2003

Co-organizer of the Netherlands Astronomy Conference.

2002

Developed the Theoretical Astrophysics in the Netherlands (TAN) website; a ‘virtual theory observatory’ or repository for numerical codes used at different institutes to model 3D (relativistic) MHD processes, radiation transport, etc.

Webmaster for the departmental website.

LANGUAGE SKILLS

NATURAL

Dutch (native) and English (fluent);

Basic knowledge of Spanish (*Certificado I and II, Nivel de Español como Lengua Extranjera* at the Public University of Utrecht), French and German.

COMPUTER

Operating Systems: Apple OS X (proficient), Linux, UNIX and Windows;

Software: Fortran, Mathematica, IDL, C, Latex, Perl (and xhtml, xml, xslt, css).