Dr. Andreas Wingen

Research and Professional Experience

04/2015 – today	Scientist in the Fusion Energy Division at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, USA. On long-term assignment at General Atomics, San Diego, USA. • Heat flux modeling in DIII-D and on 3D PFCs in NSTX-U. • Helical core modeling with VMEC on DIII-D, C-Mod and ITER.
04/2012 – 03/2015	Postdoc in the Fusion Energy Division at Oak Ridge National Laboratory. On long-term assignment at General Atomics. • Development of a soft X-ray imaging inversion technique and a synthetic diagnostic with application to DIII-D. • Plasma response to applied RMP with M3D-C1 and VMEC. • Heat flux modeling in DIII-D using particle drift effects.
02/2011 – 03/2011	Invited Visiting Researcher at General Atomics, San Diego. • Vacuum magnetic edge topology with applied RMP fields in ITER.
02/2010 – 03/2010	Invited Visiting Researcher at General Atomics (GA), San Diego. • Modeling of ELM filament structures in DIII-D based on thermoelectric currents in short connection length flux loops.
2008 – 2009	6 months invited Visiting Research Scholar at the University of California San Diego (UCSD) in cooperation with GA, San Diego. • Modeling and analysis of the vacuum magnetic edge topology with applied RMP fields in DIII-D using the MAFOT code.
01/2006 – 12/2011	Postdoctoral Research Associate at the Institute for Theoretical Physics I, Heinrich-Heine University (HHU), Düsseldorf, Germany. • Simulation of stochastic plasma edge in DIII-D and TEXTOR. • Development of MAFOT code for field-line and drift-orbit tracing. • Ambipolar electric fields, heat flux and particle drift modeling with applied RMP in TEXTOR

Education and Training

10/2010 – 04/2011	Postdoctoral lecture qualification - **Habilitation -** at the Heinrich-Heine University, Düsseldorf, Germany.
02/2003 – 01/2006	**Dr. rer. nat. (Ph.D.)** at the Institute for Theoretical Physics I, Heinrich-Heine University, Düsseldorf, Germany. Major: Plasma Physics
09/1997 – 11/2002	**Physics Diploma (B.S. & M.S.)** at the Institute for Theoretical Physics I, Heinrich-Heine University, Düsseldorf, Germany. Major: Theoretical Physics and Applied Mathematics

Selected Publications

- A. Wingen, R. S. Wilcox, L. F. Delgado-Aparicio, R. Granetz, S. Houshmandyar, S. Shiraiwa, M. R. Cianciosa, and S. K. Seal, "*Helical core formation and evolution during current ramp-up in the high-field tokamak Alcator C-Mod*", Phys. Plasmas 26, 022501 (2019)

- A. Wingen, R.S. Wilcox, S.K. Seal, E.A. Unterberg, M.R. Cianciosa, L.F. Delgado-Aparicio, S.P. Hirshman and L.L. Lao, "*Use of reconstructed 3D equilibria to determine onset conditions of helical cores in tokamaks for extrapolation to ITER",* Nucl. Fusion **58**, 036004 (2018)

- A. Wingen, R. S. Wilcox, M. Cianciosa, S. K. Seal, E. A. Unterberg, J. M. Hanson, S. P. Hirshman, L. L. Lao, N. C. Logan, C. Paz-Soldan and M. A. Shafer, "*Use of reconstructed 3-D VMEC equilibria to match effects of toroidally rotating discharges in DIII-D",* Nucl. Fusion **57,** 016013 (2017)

- A. Wingen, N.M. Ferraro, M.W. Shafer, E.A. Unterberg, J.M. Canik, T.E. Evans, D.L. Hillis, S.P. Hirshman, S.K. Seal, P.B. Snyder and A.C. Sontag, "*Connection between plasma response and RMP ELM suppression in DIII-D",* Plasma Phys. Control. Fusion **57**, 104006 (2015)

- A. Wingen, M.W. Shafer, E.A. Unterberg, J.C. Hill and D.L. Hillis, "*Regularization of soft-X-ray imaging in the DIII-D tokamak",* J. Comput. Phys. **289**, 83 (2015)

- A. Wingen, N.M. Ferraro, M.W. Shafer, E.A. Unterberg, T.E. Evans, D.L. Hillis and P.B. Snyder, "*Impact of plasma response on plasma displacements in DIII-D during application of external 3-D perturbations",* Nucl. Fusion **54**, 064007 (2014)

- A. Wingen, O. Schmitz, T.E. Evans, and K.H. Spatschek, "*Heat flux modelling using ion drift effects in DIII-D H-mode plasmas",* Phys. Plasmas **21**, 012509 (2014)

- A. Wingen, T.E. Evans, C.J. Lasnier and K.H. Spatschek, "*Numerical modeling of ELM stripe structures on divertor plates based on thermoelectric currents",* Phys. Rev. Lett. **104**, 175001 (2010)

- A. Wingen and K.H. Spatschek, "*Sheared plasma rotation in partially stochastic magnetic fields"*, Phys. Rev. Lett. **102**, 185002 (2009)

- A. Wingen, T.E. Evans, and K.H. Spatschek, "*High resolution numerical studies of separatrix splitting due to non-axisymmetric perturbation in DIII-D"*, Nucl. Fusion **49**, 055027 (2009)

- A. Wingen, M. Jakubowski, K.H. Spatschek, S.S. Abdullaev, K.H. Finken, M. Lehnen, and the TEXTOR team, "*Traces of stable and unstable manifolds in heat flux patterns",* Phys. Plasmas **14**, 042502 (2007)

Collaborations and presentations

- 2016 – 2017, collaboration with PSFC at MIT for work on C-Mod helical cores.
- Since 2008, ongoing collaboration with the DIII-D tokamak facility
- 2003 – 2012, collaboration with the Institute for Energy and Climate Research (IEK) and the TEXTOR-DED tokamak at the Research Center (FZ) Jülich.
- Invited talks at APS-DPP (2018) on helical cores and SFP-workshop (2013) on plasma response. Six presentations to APS-DPP, three presentations to EPS conferences and five to SFP-workshops for work on DIII-D, C-Mod and TEXTOR.