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## Publications

### Daily and annual modulation rate of low mass dark matter in silicon detectors

Dinmohammadi, A., Heikinheimo, M., Mirabolfathi, N., Nordlund, K., Safari, H., Sassi, S. & Tuominen, K., Mar 2024, In: Journal of Physics G: Nuclear and Particle Physics. 51, 3, 12 p., 035201.

### Latent ion tracks were finally observed in diamond

Amekura, H., Chettah, A., Narumi, K., Chiba, A., Hirano, Y., Yamada, K., Yamamoto, S., Leino, A., Djurabekova, F., Nordlund, K., Ishikawa, N., Okubo, N. & Saitoh, Y., 27 Feb 2024, In: Nature Communications. 15, 1, 10 p., 1786.

### Investigation of surface orientation dependent sputtering of Ag

Nilsson, R., Choupanian, S., Ronning, C., Nordlund, K. & Granberg, F., 14 Feb 2024, In: Journal of Physics. Condensed Matter. 36, 6, 10 p., 065002.

### Suspended nanoporous graphene produced by swift heavy ion bombardment

Iveković, D., Tomić Luketić, K., Vázquez, H., Leino, A., Djurabekova, F., Nordlund, K., Madauß, L., Liebsch, Y., Schleberger, M. & Karlušić, M., 1 Feb 2024, In: Materials Chemistry and Physics. 313, 9 p., 128729.

### Unveiling the radiation-induced defect production and damage evolution in tungsten using multi-energy Rutherford backscattering spectroscopy in channeling configuration

Markelj, S., Jin, X., Djurabekova, F., Zavašnik, J., Punzón-Quijorna, E., Selinger, T. S., Crespillo, M. L., López, G. G., Granberg, F., Lu, E., Nordlund, K., Šestan, A. & Kelemen, M., 15 Jan 2024, In: Acta Materialia. 263, 11 p., 119499.

### Formation and self-organisation of nano-porosity in swift heavy ion irradiated amorphous Ge

Bierschenk, T., Leino, A., Wesch, W., Afra, B., Rodriguez, M. D., Djurabekova, F., Keller, L., Pakarinen, O. H., Nordlund, K., Ridgway, M. C. & Kluth, P., 1 Dec 2023, In: Acta Materialia. 261, 11 p., 119396.

### Complex $\text{Ga}_2\text{O}_3$ polymorphs explored by accurate and general-purpose machine-learning interatomic potentials

Zhao, J., Byggmästar, J., He, H., Nordlund, K., Djurabekova, F. & Hua, M., Dec 2023, In: Npj computational materials. 9, 1, 10 p., 159.

### Crystal-orientation-dependent physical sputtering from four elemental metals

Balden, M., Schlueter, K., Dhard, D., Bauer, P., Nilsson, R., Granberg, F., Nordlund, K. & Hobler, G., Dec 2023, In: Nuclear Materials and Energy. 37, 9 p., 101559.

### Effects of lattice and mass mismatch on primary radiation damage in W-Ta and W-Mo binary alloys

Wei, G., Byggmästar, J., Cui, J., Nordlund, K., Ren, J. & Djurabekova, F., Sept 2023, In: Journal of Nuclear Materials. 583, 8 p., 154534.

### Anisotropic ionization threshold and directional sensitivity in solid state DM detectors

Heikinheimo, M., Sassi, S., Tuominen, K., Nordlund, K. & Mirabolfathi, N., 3 Jul 2023, 14th International Conference on Identification of Dark Matter (IDM2022) . SCIPOST FOUNDATION, 5 p. (SciPost Physics Proceedings; vol. 12, no. 020).

**Energy loss due to defect creation in solid state detectors**

Heikinheimo, M., Sassi, S., Tuominen, K., Nordlund, K. & Mirabolfathi, N., 3 Jul 2023, *14th International Conference on Identification of Dark Matter (IDM2022)*. SCIPOST FOUNDATION, 6 p. (SciPost Physics Proceedings; vol. 12, no. 010).

**Sputter yield reduction and fluence stability of numerically optimized nanocolumnar tungsten surfaces**

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**Efficient atomistic simulations of radiation damage in W and W-Mo using machine-learning potentials**

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**Formation of parallel and perpendicular ripples on solid amorphous surfaces by ion beam-driven atomic flow on and under the surface**

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**Tekoäly tulee, ole valmis!**

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**Direct observation of ripples under different angles at low energy**

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**Identification of the low-energy excess in dark matter searches with crystal defects**

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**Molecular dynamics simulations of high-dose damage production and defect evolution in tungsten**

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## Projects

**Materials- and Nanophysics Researcher Community (MATENA)**

Ahlgren, T., Aitola, K., Arstila, K., Avchachov, K., Björkas, C., Chrobak, D., Costelle, L., Djurabekova, F., Fernandez Martinez, M., Galambosi, S., Hakala, M., Harjunmaa, A. N., Heinola, K., Hirvelä, J. H., Holmström, E. K., Huotari, S., Hämäläinen, K., Ikonen, T., Jalkanen, P., Jansson, V., Juurinen, I., Keinonen, J., Keyriläinen, J., Kisko, K., Koskelo, O., Krasheninnikov, A., Kuronen, A., Lasa Esquisabel, A., Laukkanen, J. K., Lehtinen, O. J., Lehtola, S., Svedström, K. J., Mattila, A., Meinander, N. K., Mizohata, K., Nordlund, K., Nygård, K., Pakarinen, O. H., Palonen, V., Parviaainen, S., Peura, M., Pirkkalainen, K., Pirojenko, A., Pohjonen, A., Polvi, J., Porra, L., Pusa, P., Pylkkänen, T., Rauhala, E., Ruotsalainen, K., Ruzibaev, A., Räisänen, J., Sajavaara, T. P., Sacco, A., Serimaa, R., Soininen, A., Suhonen, H., Timko, H., Tolvanen, A., Torkkeli, M., Tuboltsev, V., Ullah, M., Väyrynen, S. & Vörtler, K.  
22/02/2011 → 22/02/2011

**Nanohiukkasten optiset ja pintaominaisuudet**

Kulmala, M., Nordlund, K., Keinonen, J., Sundholm, D. & Räsänen, M.  
Suomen Akatemia

01/01/2007 → 31/12/2010

**MachQu: Probabilistic Machine Learning for Quantum Mechanics-Based Material Design**  
Roos, T., Djurabekova, F. & Nordlund, K.  
01/01/2018 → 31/12/2019

## Activities

### TAITASMARTGIS

Petri Pellikka (Speaker: Chair), Tom Böhling (Speaker: Keynote), Kaarle Hämeri (Speaker: Keynote), Mika Siljander (Speaker: Chair), Laura Alakukku (Attendee), Juuso Tuure (Speaker: Presenter), Pirjo Mäkelä (Attendee), Matti Räsänen (Speaker: Presenter), James Mwangombe Mwamodenyi (Speaker: Presenter), Sheila Aswani Wachiye (Speaker: Presenter), Hari Adhikari (Speaker: Presenter), Edward Amara (Attendee), Janne Heiskanen (Attendee), Temesgen Abera (Speaker: Presenter), Eduardo Maeda (Attendee), Simon Schallhart (Attendee), Werner Kutsch (Speaker: Presenter), Antti Autio (Attendee), Kristiina Karhu (Speaker: Presenter), Kevin Mganga (Attendee), Risto Vesala (Attendee), Laura Arppe (Attendee), Hanna Rostila (Speaker: Presenter), Enrico Di Minin (Attendee) & Kai Nordlund (Speaker: Presenter)  
1 Oct 2019

**Insights on sputtering and deposition mechanisms from molecular dynamics simulations**  
Kai Nordlund (Speaker)  
7 Dec 2018

**Possibility of materials modification by dark matter particle irradiation**  
Kai Nordlund (Speaker)  
27 Nov 2018

**Improving on analytical radiation damage calculations: arc-dpa and rpa**  
Kai Nordlund (Speaker)  
16 Oct 2018

**Fundamental mechanisms of accelerated and plasma ion interactions with materials: insights from atomistic simulations**  
Kai Nordlund (Speaker)  
21 Jun 2018

**Channeling effects in nanostructures: analysis and comparisons with experiments**  
Kai Nordlund (Speaker)  
13 Apr 2018

**Nuclear stopping power of antiprotons**  
Kai Nordlund (Speaker)  
14 Mar 2018

**Molecular dynamics simulations of collision cascades: method developments and results from 1993 on**  
Kai Nordlund (Speaker)  
7 Dec 2017

**High-dose damage evolution in Fe, FeCr, and high-entropy alloys**  
Kai Nordlund (Speaker)  
15 Nov 2017

**Improving atomic displacement calculations with physically realistic damage models: arc-dpa and rpa**  
Kai Nordlund (Speaker)  
25 Oct 2017

**Systematic analysis of ion channeling over all crystal directions: dependences on energy, crystal structure, atom size, temperature, and defect concentration**

Kai Nordlund (Speaker)

24 Oct 2017

**Insights to physics of sputtering and channeling effects learnt from molecular dynamic simulations**

Kai Nordlund (Speaker)

21 Aug 2017

**Current topics of modelling in materials science (in Helsinki)**

Kai Nordlund (Speaker) & Flyura Gatifovna Djurabekova (Speaker)

3 Aug 2017

**20th INTERNATIONAL CONFERENCE ON SURFACE MODIFICATION OF MATERIALS BY ION BEAMS**

Kai Nordlund (Attendee)

11 Jul 2017

**Nanoscale pattern formation at surfaces and Formation of 3D nanostructures**

Flyura Djurabekova (Chair), Kai Henrik Nordlund (Chair), Christoffer John Patrik Fridlund (Member of organizing committee), Andrew Iljinov (Secretary of organizing committee), Alvaro Lopez Cazalilla (Member of organizing committee) & Antti Armas Kuronen (Scientific Committee Vice Chair)

26 Jun 2017 → 30 Jun 2017

**Tutorial: atomistic simulations for irradiation effects.**

Kai Nordlund (Speaker)

15 Nov 2016

**International conference on metallurgical coatings and thin films (ICMCTF)**

Kai Nordlund (Speaker: Keynote)

2016

**MRS fall meeting, symposium Ion Beam Enabled Nanoscale Fabrication and Materials Synthesis**

Kai Nordlund (Speaker: Keynote)

2016

**Summer school on plasma-surface interactions**

Kai Nordlund (Speaker: Presenter)

2016

**Workshop on nanocluster deposition**

Kai Nordlund (Speaker: Keynote)

2016

**Fysiikan päivät 2015**

Kai Nordlund (Speaker: Keynote)

17 Mar 2015

**CECAM workshop on Modeling metal-based nanoparticles: toward realistic environments**

Kai Nordlund (Speaker: Keynote)

2015

**International Symposium on Multi-scale Modeling and Simulation of Materials**

Kai Nordlund (Speaker: Keynote)

2015

**MRS Fall Meeting, symposium Defect and Radiation Effects in Advanced Materials**  
Kai Nordlund (Speaker: Keynote)  
2015

**MRS Spring Meeting, symposium Multiscale modeling of microstructural evolution in nuclear materials**  
Kai Nordlund (Speaker: Keynote)  
2015

**Radiation Effects in Insulators School, Invited tutorial talk**  
Kai Nordlund (Speaker: Keynote)  
2015

**Towards Reality in Nanoscale Materials**  
Kai Nordlund (Chair)  
2015

**Director of MATRENA doctoral programme**  
Kai Nordlund (Director)  
1 Jan 2014 → ...

**18th International Conference on Surface Modification of Materials by Ion Beams**  
Kai Nordlund (Speaker: Keynote)  
2014

**2014 Nuclear materials Conference**  
Kai Nordlund (Speaker: Keynote)  
2014

**22nd International Conference on Ion-Surface Interactions**  
Kai Nordlund (Speaker: Keynote)  
2014

**EMRS Spring meeting, Symposium Defect-induced effects in nanomaterials**  
Kai Nordlund (Speaker: Keynote)  
2014

**EUROFusion (External organisation)**  
Kai Nordlund (Member)  
2014 → ...

**European Grid Infrastructure Community Forum**  
Kai Nordlund (Chair)  
2014

**International Atomic Energy Agency (External organisation)**  
Kai Nordlund (Expert member)  
2014 → 2017

**Towards Reality in Nanoscale Materials**  
Kai Nordlund (Chair)  
2014

**Radiation Effects in Insulators**

Kai Nordlund (Chair)

30 Jun 2013 → 5 Jul 2013

**8th symposium of the International Society for Theoretical Chemical Physics**

Kai Nordlund (Speaker: Keynote)

2013

**EMRS Spring meeting, Symposium Ion Beam Applications: New and Innovative Approaches**

Kai Nordlund (Speaker: Keynote)

2013

**International Atomic Energy Agency (External organisation)**

Kai Nordlund (Expert member)

2013 → 2017

**IUMRS-ICAM Modeling & Simulation Session**

Kai Nordlund (Chair)

2013

**Towards Reality in Nanoscale Materials**

Kai Nordlund (Chair)

2013

**3rd EU-Russia Innovation Forum**

Kai Nordlund (Speaker: Keynote)

2012

**All-Russian Conference in Physical and physico-chemical bases of ion implantation**

Kai Nordlund (Speaker: Keynote)

2012

**Harriet Åhlgren, PhD thesis co-supervision**

Kai Nordlund (Co-supervisor)

2012 → 2015

**international committee for conference series Ion Beam Modification of Materials (IBMM) (External organisation)**

Kai Nordlund (Board member)

2012 → ...

**International supercomputing conference**

Kai Nordlund (Speaker: Keynote)

2012

**Joint ICTP-IAEA workshop on Fusion Plasma Modelling**

Kai Nordlund (Speaker: Keynote)

2012

**Recent developments in the study of radiation effects in matter (REM) invitation-only meeting**

Kai Nordlund (Speaker: Presenter)

2012

**Towards Reality in Nanoscale Materials**

Kai Nordlund (Chair)

2012

**20th International Conference on Ion-Surface Interactions**  
Kai Nordlund (Attendee)  
2011

**Aleksi A Leino, PhD thesis co-supervision**  
Kai Nordlund (Co-supervisor)  
2011 → 2015

**Andrea Sand, PhD thesis supervision**  
Kai Nordlund (Supervisor)  
2011 → 2015

**Andrey Ilinov, PhD thesis co-supervision**  
Kai Nordlund (Co-supervisor)  
2011 → 2015

**Breakdown Physics Workshop (MeVArc)**  
Kai Nordlund (Chair)  
2011

**EMRS/IUMRS/ICAM Spring meeting 2011 symposium 'Ion and cluster ion beams for the synthesis and controlled modification of nanomaterials'**  
Kai Nordlund (Chair)  
2011

**Fall MRS 2011 meeting, symposium Self-organization and nanoscale pattern formation**  
Kai Nordlund (Speaker: Keynote)  
2011

**International Committee for Radiation Effects in Insulators (REI) conference (External organisation)**  
Kai Nordlund (Board member)  
2011 → 2015

**Konstantin Avchachiov, PhD thesis supervision**  
Kai Nordlund (Co-supervisor)  
2011 → 2015

**OECD Nuclear Energy Agency (External organisation)**  
Kai Nordlund (Chair)  
2011 → 2015

**PRACE Summer School for advanced programming of Tier-0 supercomputers**  
Kai Nordlund (Speaker: Keynote)  
2011

**Spring MRS meeting, symposium Ion Beams – New Applications from the Mesoscale to Nanoscale**  
Kai Nordlund (Speaker: Keynote)  
2011

**Towards Reality in Nanoscale Materials**  
Kai Nordlund (Chair)  
2011

**18th International Workshop on Inelastic Ion-Surface Collisions**  
Kai Nordlund (Speaker: Keynote)  
2010

**24th International Conference on Atomic Collisions in Solids**  
Kai Nordlund (Speaker: Keynote)  
2010

**CECAM workshop on radiation damage and non-adiabatic simulations**  
Kai Nordlund (Speaker: Keynote)  
2010

**CIMTEC 2010 - 12th International Ceramics Congress \& 5th Forum on New Materials**  
Kai Nordlund (Speaker: Keynote)  
2010

**Mohammad Wali Ullah, PhD thesis supervision**  
Kai Nordlund (Co-supervisor)  
2010 → 2014

**OECD Nuclear Energy Agency (External organisation)**  
Kai Nordlund (Chair)  
2010 → 2014

**SPIE Photonics West Meeting on Synthesis and Photonics of Nanoscale Materials VII (SPnsM-VII)**  
Kai Nordlund (Speaker: Keynote)  
2010

**Spring MRS meeting, symposium Materials for Nuclear Applications and Extreme Environments**  
Kai Nordlund (Speaker: Keynote)  
2010

**Towards Reality in Nanoscale Materials**  
Kai Nordlund (Chair)  
2010

**Aarne Pohjonen, PhD thesis co-supervision**  
Kai Nordlund (Co-supervisor)  
2009 → 2013

**Ane Lasa, PhD thesis supervision**  
Kai Nordlund (Supervisor)  
2009 → 2013

**Eero Holmström, PhD thesis supervision**  
Kai Nordlund (Supervisor)  
2009 → 2012

**Helga Timko, PhD thesis supervision**  
Kai Nordlund (Co-supervisor)  
2009 → 2011

**Nanostructures in silica**

Kai Nordlund (Chair)

2009

**Ville Jansson, PhD thesis co-supervision**

Kai Nordlund (Co-supervisor)

2009 → 2013

**Ville Jansson, PhD thesis supervision**

Kai Nordlund (Co-supervisor)

2009 → 2013

**Katharina Vörbler, PhD thesis supervision**

Kai Nordlund (Supervisor)

2008 → 2011

**Marie Backman, PhD thesis supervision**

Kai Nordlund (Co-supervisor)

2008 → 2012

**Antti Tolvanen, Co-Supervision of PhD thesis**

Kai Nordlund (Supervisor)

2007 → 2010

**Jussi Polvi, PhD thesis supervision**

Kai Nordlund (Supervisor)

2007 → 2013

**Ari Harjunmaa, Supervision of PhD thesis**

Kai Nordlund (Supervisor)

2006 → 2011

**Carolina Björkas, Supervision pf PhD thesis**

Kai Nordlund (Supervisor)

2006 → 2009

**Niklas Juslin, Supervision of PhD thesis**

Kai Nordlund (Supervisor)

2006 → 2009

**Tommi Järvi, Supervision of PhD thesis**

Kai Nordlund (Supervisor)

2006 → 2009

**Invited talks at international conferences 2005 - 2010**

Kai Nordlund (Speaker: Presenter)

1 Jan 2005 → 31 Dec 2010

**Co-supervision of PhD thesis**

Kai Nordlund (Supervisor)

2005 → 2007

**Juha Samela, Supervision of PhD thesis**

Kai Nordlund (Supervisor)

2005 → 2008

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2004 → 2009

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2002 → 2006

**Krister Henriksson, Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2001 → 2005

**International Committee for the Computer simulation of radiation effects in solids (COSIRES) conference (External organisation)**  
Kai Nordlund (Board member)  
2000 → ...

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2000 → 2003

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2000 → 2003

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
2000 → 2004

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
1999 → 2002

**Supervision of PhD student**  
Kai Nordlund (Supervisor)  
1997 → 2000

**Supervision of PhD thesis**  
Kai Nordlund (Supervisor)  
1997 → 2000

**Yunzheng Zhong, Co-supervision of PhD thesis**  
Kai Nordlund (Co-supervisor)  
1997 → 1999