

Happy Holidays!

This is ARCNL's fourth newsletter. Since its start three years ago, ARCNL has been growing rapidly, which is visible in the number of employees, the number of research groups and by our overcrowded laboratory and office building. Our scientific program is maturing with the first publications already appearing in print. And the building activities for ARCNL's long-term housing are about to begin. It is with great enthusiasm that we give you a flavor of these inspiring developments.



On behalf of the entire staff of ARCNL we wish you happy holidays and a wonderful 2017.

Marjan Fretz (Manager of Operations) and Joost Frenken (Director)

ARCNL highlights 2016



Sonia Castellanos

People

In 2016 ARCNL grew to a total staff of 80 people (70 fte); we are well on our way to reach the final number of 100 fte. We have welcomed two new group leaders in 2016. **Sonia Castellanos Ortega** started her *EUV Photoresist Group*.

The research of this 'tenure tracker' and her group is devoted to unraveling the interaction mechanisms of EUV light with photoresists and to use the acquired insights to design and synthesize new classes of these materials.

In the summer, **Jan van Dijk** was appointed as part-time group leader of the *EUV Plasma Modeling Group*. His research focus lies on modeling of the complex dynamics of the laser-produced tin plasmas that are used as the primary source of EUV light for nanolithography.

In the context of the further completion of its research portfolio, ARCNL is scouting for excellent candidates for new tenure-track positions and for PhD-student and postdoctoral positions to staff their new groups.

An updated list of job openings can be found on www.arcnl.nl.



Jan van Dijk

Publications and patents

We are very proud to report that this year the first results of research fully performed at ARCNL have been published in three peer-reviewed scientific papers.

■ *D. Kurilovich, A.L. Klein, F. Torretti, R. Hoekstra, W. Ubachs, H. Gelderblom and O.O. Versolato*, Plasma Propulsion of a Metallic Micro-droplet and its Deformation upon Laser Impact, *Phys. Rev. Appl.* 6, 014018: 1-8 (2016).

■ *G.S.M. Jansen, D. Rudolf, L. Freisem, K.S.E. Eikema, S. Witte*, Spatially resolved Fourier transform spectroscopy in the extreme ultraviolet, *Optica* 3, 1122-1125 (2016)

■ *A Windberger, F. Torretti, A. Borschevsky, A. Ryabtsev, S. Dobrodey, H. Bekker, E. Eliav, U. Kaldor, W. Ubachs, R. Hoekstra, J.R. Crespo López-Urrutia and O.O. Versolato*, Analysis of the fine structure of $\text{Sn}^{11+ - 14+}$ ions by optical spectroscopy in an electron beam ion trap, *Phys. Rev. A* 94, 012506: 1-11 (2016).

More papers are in the pipeline. In addition, ASML has applied for patents on several ideas that ARCNL contributed in 2016.

Honors

Two ARCNL group leaders acquired international recognition from their peers for their scientific achievements.

Wim Ubachs was elected as Fellow of the American Physical Society (APS) and **Paul Planken** was elected as Fellow of the Optical Society (OSA).

Workshops

ARCNL hosted two international workshops in 2016, both in November. The *International Workshop on EUV and Soft X-Ray Sources* brought an international community of 95 researchers from academia and industry to Amsterdam. The focus was on the generation of photons in the EUV and soft x-ray wavelength regime using a variety of techniques. The *Workshop on Low-Energy Electrons in Lithography, Imaging and Soft Matter (LEELIS-II)* was held in Amsterdam for the second time. The 40 attendees addressed the interactions between low-energy electrons and soft matter from complementary perspectives, involving condensed matter physics, chemical engineering, low-energy electron microscopy and EUV lithography.

Participants of the Workshop on EUV and Soft X-Ray Sources



Poster session LEELIS II



Teaching

This year, ARCNL made a serious start with its contribution to the joint teaching program of UvA and VU by organizing three lecture series in the Research Variant *Advanced Matter and Energy Physics* of the MSc curriculum. Most directly linked to ARCNL's research portfolio has been the course on *The Physics and Technology of Nanolithography*, coordinated by [Paul Planken](#), which provided a coherent overview of the fundamental physics and chemistry underlying the processes and technologies involved in EUV photolithography. [Kjeld Eikema](#) and [Joost Frenken](#) have given MSc courses on *Ultrafast Laser Physics* (an existing course that is fully 'resonant' with ARCNL) and *Surface and Interface Science* (new course).

Open Day 2016

Outreach

We invite you to check out our new website at www.arcnl.nl. On 1 October, ARCNL participated in the *Open Day* of the Amsterdam Science Park and welcomed many visitors. Using demonstrations, lectures and lab tours, we showed them how computer chips are manufactured and which scientific challenges we tackle within our research center.

Also, in 2016 ARCNL featured in several media, including a short portrait in the RTV-Noord Holland TV show *Ons Noord-Holland* (<https://arcnl.nl/news/arcnl-in-tv-program-of-rtv-noord-holland>). This year, we organized our second *Meet-Up@ARCNL*, a successful event aimed at informing MSc students on the research performed at ARCNL and identifying promising candidates for internships and PhD student positions.

Open Day 2016

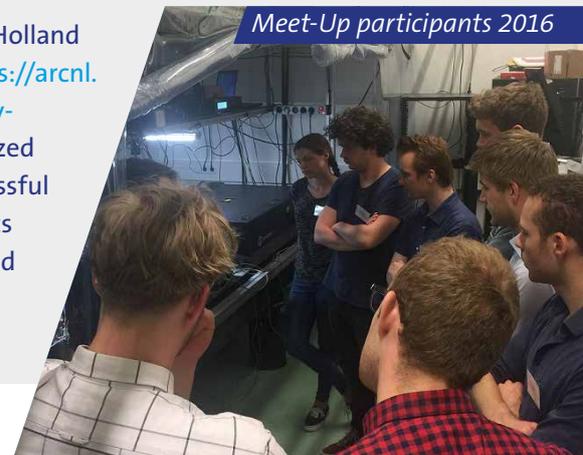


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Meet-Up participants 2016



Long-term housing

In January 2017, construction work will start on Matrix-VII, the seventh building of the company Matrix IC. Matrix-VII will be located right next to AMOLF. ARCNL will be the first and major tenant in this new building that will offer enough space to also house other organizations and companies. In 2016 all preparations, such as the design of the building and the signing of contracts were finalized. ARCNL expects to move into Matrix VII by mid 2018.



Artist Impression Matrix VII

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