Future of Computing

Topic Coming Soon

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Abstract
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Biography
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Neuromorphic Computing for Autonomous AI Systems – the NeuroSys Cluster4Excllence in the Aachen Region

M. C. Lemme
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Abstract
AI as software dominates areas such as computer vision and speech processing. However, innovative new hardware concepts are needed to sustainably realize applications such as autonomous driving, personalized healthcare, smart cities, the Internet of Things, and Economy 4.0, because conventional computer hardware is increasingly hitting inherent limits in energy efficiency for AI applications. The regional cluster NeuroSys aims to overcome these limits by developing neuro-inspired hardware that can revolutionize AI systems in terms of energy efficiency and performance.

NeuroSys collects a broad spectrum of experts who initiated an integrated and sustainable research and transformation process through interdisciplinary research and development: physicists, engineers, and material-, neuro-, and computer scientists collaborate with economists, ethicists, and sociologists on innovations that are not only technologically advanced but also economically viable and socially useful and desirable. RWTH Aachen University, as the coordinator and nucleus, works closely together with the Helmholtz Institute Forschungszentrum Jülich and the Johannes Rau Institute AMO GmbH. Regional start-ups and companies complete the cluster, while global corporations and internationally renowned scientists make up the advisory board.

I will present our goals and approach to maximize the impact of our cluster and showcase selected socio-technological highlights of our activities throughout the first two years.

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Biography
Max Lemme is a Full Professor at RWTH Aachen University and Scientific Director of AMO GmbH, a non-profit nanotechnology company in Aachen, Germany. He is a co-founder of Black Semiconductor GmbH, Aachen.

Lemme obtained his Ph.D. degree (Dr.-Ing.) on nano-CMOS field effect transistors like FinFETs and ultra-thin SOI-MOSFETs from RWTH Aachen University in 2004. He has since worked on high-k /metal gate integration, and electronic, optoelectronic and nanoelectromechanical devices based on graphene and related 2D materials, Perovskites, and phase change materials, and their integration into the silicon technology platform. His work includes the world's first top-gated graphene MOSFET, graphene-based non-volatile memory, vertical graphene hot electron transistors, graphene NEMS, ion-based memristive switches from molybdenum disulfide and silicon photonics-integrated Perovskite Lasers.

Lemme received the "NanoFutur" young researchers' award from the German Ministry for Education and Research in 2006 and a Lynen Research Fellowship from the Alexander von Humboldt Foundation in 2007. From 1998 to 2008, he worked at AMO, where his last position was as Head of the Technology Department. In 2008, he joined Harvard University in Cambridge, USA, where he pioneered a helium ion-based nanolithography method for graphene and investigated graphene photodetectors. In September 2010, he became a Guest Professor at KTH, where he initiated graphene activities within the School of ICT. He

received an ERC Starting Grant and a Heisenberg Professorship funded by the German Research Foundation (DFG) in 2012 and joined the University of Siegen, Germany as a Full Professor in the same year. In February 2017, Lemme was appointed Full Professor at RWTH Aachen University and Scientific Director of AMO GmbH. In 2018, he received an ERC Proof of Concept grant, which contributed to the founding of Black Semiconductor. He has managed numerous national and international research projects with academic and industrial partners. Recently, his research interests include materials and electronic devices for quantum and neuromorphic computing. Lemme is the coordinator of the Cluster “NeuroSys – Neuromorphic Computing for Autonomous Artificial Intelligence Systems”, one of 14 Clusters4Excllence funded by the German Ministry of Education and Research.

Future Computation Technology from Cryogenics Point of View

D. Gunnarsson
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Abstract
Cryogenics have long been an enabling technology for a wide field of research, and more recently in quantum computing with the potential to revolutionize the world and solve problems with use in all aspects of life. Cryogenics are a very integral part of the value chain by cooling the components and making sure that we can create systems that are producing a scalable way to give reliability and to increase predictability.

Biography
David Gunnarsson, CTO, leads Bluefors' cryogenic development
for the quantum technology community.
He holds a Ph. D. degree from Chalmers University of Technology, Sweden, 2005, on his work on the Josephson junction based quantum bits.
After his Ph. D. he continued research at Low Temperature Laboratory, Helsinki University of Technology (2005-2008) and prior to joining Bluefors, he worked as a Senior Scientist at VTT Technical Research Centre of Finland (2008-2015).
With his background in both microfabrication and cryogenic measurements of superconducting quantum circuits, he has a broad understanding of the future requirements in cryogenics for the quantum computation field.