

Fifth Conference of Nordic Network for Diversity in Physics

Report of Contributions

Contribution ID: 1

Type: **not specified**

Welcome

Wednesday 24 May 2023 13:00 (10 minutes)

Presenter: MALLING, Maren

Contribution ID: 2

Type: **not specified**

Keynote: Women's Stories Transforming Science

Wednesday 24 May 2023 13:20 (35 minutes)

How do we achieve diversity and inclusion (D&I)? How can a collective wish for a diverse and equal future, in physics as well as other professional areas, be fulfilled? In helping organisations answer these questions, I have over the years come to find one powerful component for igniting change: stories. In matters of gender inequity, more specifically the stories of women.

Stories have shaped the way we think about people. About women. And about women as a contradiction to people. It has shaped the way we think about a scientist and maybe even how we perceive and celebrate scientific discoveries: as a single person's accomplishment. This talk reflects upon the misrepresentation of women throughout history as a contributing cause to the lack of diversity and inclusion we are facing today. It also explores how qualitative methods and interdisciplinary thinking are valuable approaches within D&I-work in that it creates for new stories and for new thinking about old stories.

Key take aways from this talk is thus why and how it can have tremendous effect to bring stories of women into play when being given the task of increasing gender diversity and inclusion in modern organisations. D&I-processes often involves getting someone - often someone of power - to open their mind. Deconstructing our collective cultural history of gender along with presenting women's stories as they derive from qualitative surveys within the organisation, seems to create for the open mind that ignites a transformation towards diversity and inclusion. We all need for women - including women in physics - to tell their stories!

Presenter: BECK, Marie Valentin (BureauM)

Contribution ID: 3

Type: **not specified**

Swimming in the Leaky Pipeline: Supporting Female PhD Students

Wednesday 24 May 2023 13:55 (15 minutes)

From the personal perspective of someone towards the end of their PhD, I would like to share some observations on why women might choose to leave academia and physics (e.g. after the PhD), and actions which could help prevent it. I will discuss the idea of having different starting points, and the effect the environment can have on motivation and performance. Finally, I will point out the kind of support which could help from colleagues and leaders. The talk will be based on my personal experience and I am not an expert. My motivation for giving the talk is wanting to share an example of an “inside” view and highlight some nuances which may not be considered in broader discussions about how to increase diversity within physics institutions.

Presenter: TANKARD, Rikke Egeberg (Technical University of Denmark)

Contribution ID: 4

Type: **not specified**

DE&I initiatives at DTU

Wednesday 24 May 2023 14:10 (20 minutes)

Presenter: ATAN, Deniz (Technical University of Copenhagen)

Contribution ID: 5

Type: **not specified**

Keynote: Interstellar Catalysis –a Route to Molecular Complexity in Space

Wednesday 24 May 2023 15:00 (40 minutes)

Interstellar space harbours a surprising chemical complexity in spite of the extremely low temperatures and pressures that characterize it. More than 225 different molecules have been detected including both simple molecules such as H₂ and water, as well as larger molecules such as C₆₀ and polycyclic aromatic hydrocarbons (PAHs). Even biologically relevant molecules such as glycolaldehyde –a sugar precursor –have been detected. The largest molecular complexity is observed in dense interstellar dust and molecular clouds –the regions where new stars and planetary systems form. Interstellar molecules play a key role in the star and planet formation process and are at later stages delivered to planetary surfaces where they may have contributed to the origin of life. The surprising chemical complexity found in space is thought to be catalyzed by interstellar nanoscale dust grains and large carbonaceous molecules such as polycyclic aromatic hydrocarbons (PAHs). Surface science techniques like scanning tunneling microscopy (STM), temperature programmed desorption (TPD) and density functional theory (DFT) allow us to study and model such reactions on surfaces under conditions that mimic those found in interstellar space. The ultimate aim is to determine the degree of chemical complexity attainable via catalytic reactions at 10 K and under ultrahigh vacuum conditions. Specifically, we aim to discover whether the molecular building blocks of life –amino acids, dna bases, sugars and fatty acids –can form even before the formation of stars and planets, at the extremely low temperatures and pressures found in interstellar space.

Presenter: Prof. HORNEKÆR, Liv (Aarhus University)

Contribution ID: 6

Type: **not specified**

Quantum strings and the gauge/gravity duality

Wednesday 24 May 2023 15:40 (20 minutes)

In string theory the gauge/gravity duality (also known as AdS/CFT correspondence) has proven an invaluable tool in the exploration of both strongly coupled quantum field theories and quantum gravity, thanks to its strong-weak nature. On the other hand, in recent years remarkable progress have been made in computing exact answers for observables in strongly coupled quantum field theories thanks to localisation.

In this talk I will start by giving a short introduction to the AdS/CFT correspondence and localisation, and explain how their relation provides us with numerous precision tests of the duality, from which we can learn about gravity beyond the classical limit.

Presenter: Prof. GIANGRECO M PULETTI, Valentina (University of Iceland)

Contribution ID: 7

Type: **not specified**

The Belle II Experiment

Wednesday 24 May 2023 16:00 (15 minutes)

Belle II is a flavor physics experiment at the asymmetric e^+e^- collider SuperKEKB in Japan. It aims to record an order of magnitude more data than its predecessor Belle experiment. Belle II started operation in 2019 and to date has accumulated $\sim 430 \text{ fb}^{-1}$ of data. The Uppsala University recently joined the experiment, becoming the first Scandinavian country in a collaboration that boasts more than 25 collaborating countries and 120 institutions. In this talk we will present the status and plans of the Belle II experiment, giving an overview of the physics that can be studied and covering a few of its recent results.

Presenter: Dr SCAVINO, Bianca (Uppsala University)

Contribution ID: 8

Type: **not specified**

Constructive Interference of Art and Science

Wednesday 24 May 2023 16:15 (15 minutes)

Interference is an art and science project which uses light and sound installations to communicate abstract and complex wave phenomena in physics and astronomy to the general public. The project outcome was an exhibition that combined art and science to explore how our emotional and sensory impressions from light and sound interfere with scientific understanding and practice. The installations communicated physics and astronomy to a broad and diverse audience by using intuitive parallels between light and sound. The installations were on the topics of the electromagnetic spectrum, emission and absorption of light by atoms, spectroscopy, optics, dark matter, black holes, and the evolution of the Universe. The project was executed collaboration with electro-acoustic composer and installation artist Signe Heinfelt. Interference consists of eight light and sound installations that were exhibited in Nikolaj Kunsthal 10th of February to 7th of May. The exhibition was widely acclaimed for creating an equal exploratory space for art and science.

Presenter: VERWOHLT, Jo

Contribution ID: 9

Type: **not specified**

Open lecture: Attosecond Light Pulses for Studying Ultrafast Electron Dynamics

Wednesday 24 May 2023 17:00 (1 hour)

Extreme Ultraviolet light sources based on high-order harmonic generation in gases are now used in many areas of science. The radiation consists of a train of extremely short light bursts, in the attosecond range, allowing for outstanding temporal resolution. HHG has opened the field of attosecond science, where ultrafast electron dynamics in matter is captured. In this presentation, I will give an introduction to this field of research. I will also share a few thoughts about gender aspects in my career.

Presenter: Prof. L'HUILLIER, Anne (Lund University)

Contribution ID: **10**

Type: **not specified**

Registration

Wednesday 24 May 2023 12:30 (30 minutes)

Contribution ID: 11

Type: **not specified**

Gender-equality Paradox in Sweden

Thursday 25 May 2023 09:40 (20 minutes)

Presenter: Prof. LARSSON, Åsa (Stockholm University)

Contribution ID: 12

Type: **not specified**

Stranger Things - Physics at the femtometer scale

Thursday 25 May 2023 09:20 (20 minutes)

The world around us consists of protons and neutrons –tightly bound quark systems that just like other hadrons are confined by the strong interaction. The processes occur at distances corresponding to a femtometer, i.e. 10-15 m, and generates almost 99% of the visible mass of the Universe. To describe these interactions quantitatively, belong to the most challenging problems in contemporary physics. Hyperons –quark triplets just like the protons but containing at least one heavier strange or charm quark –can shed new light on this puzzle. Being unstable, hyperons reveal through their decays more about their inner properties than protons. In particular, the hyperon spin can be traced in weak, parity violating decays. This feature makes hyperons a powerful diagnostic tool. In this talk, I will demonstrate how spin polarised and quantum entangled strange hyperons can be exploited to measure their structure and size at the femtometer scale. I will present recent progress from ongoing experiment and discuss future opportunities offered by facilities world-wide. Finally, I will share some personal reflections on my career path as a woman in physics and provide some tips for the next generation.

Presenter: Prof. SCHÖNNING, Karin (Uppsala University)

Contribution ID: 13

Type: **not specified**

Finland diversity talk

Thursday 25 May 2023 09:00 (20 minutes)

Presenter: Dr LAURI, Katja (University of Helsinki)

Contribution ID: 14

Type: **not specified**

Tuning the properties of Janus van der Waals hetero structures by varying interface terminations: A first principles investigation

Thursday 25 May 2023 10:00 (20 minutes)

The ever-growing energy needs demand technological development related to photo catalysis. Conventional photo-catalytic materials suffer from low quantum efficiency, charge-recombination, and chemical back-reactions. Janus van der Waals hetero structures, are 2D materials where a metal atomic layer M is sandwiched between layers X and Y of two different chalcogen, halogen, or pnictogen atoms owing to finite out-of-plane dipole moments, and possess enhanced photo-catalytic properties due to their intrinsic Rashba effect, strongly bound excitons, and strong interaction with light [1]. In this study, two dimensional (2D) GaAs/MoSSe Janus interfaces were investigated using first principles calculations. The effect of different atomic terminations on the interface stability, electronic properties and charge transfer at the interfaces were analyzed and found that conducting properties are altered with respect to different terminations. Metallic states are formed at the stable MoSSe/GaAs interface due to the presence of 2D occupied antibonding states in MoSSe and the band alignment at the interface. We demonstrate that the non-symmetric structure of MoSSe Janus material plays a key role in controlling the electronic properties of the stable Janus interface, which will be crucial deciding factor for practical applications [2]. 1. Pan, Linfeng, et al. "Boosting the performance of Cu₂O photocathodes for unassisted solar water splitting devices." *Nature Catalysis* 1.6 (2018): 412-420. 2. Albar, Arwa, and S. Assa Aravindh. "Emergence of metallic states at 2D MoSSe/GaAs Janus interface: a DFT study." *Journal of Physics: Condensed Matter* 33.47 (2021): 475701.

Presenter: Dr ARAVINDH, S. Assa (NANOMO, University of Oulu)

Contribution ID: 15

Type: **not specified**

Stelpur diffra - Girls differentiate

Thursday 25 May 2023 10:20 (20 minutes)

An academic summer camp in mathematics for girls and gender queer high school students in Iceland.

Presenter: KRISTJÁNSDÓTTIR, Nanna (University of Iceland)

Contribution ID: 16

Type: **not specified**

Norway diversity talk

Contribution ID: 17

Type: **not specified**

Norway physics talk

Contribution ID: 18

Type: **not specified**

Cosmic Rate of Type II_n Supernovae

Thursday 25 May 2023 11:25 (15 minutes)

Massive stars end their lives in violent explosions known as supernovae. Some of these objects explode into material surrounding the star resulting in interaction visible in both spectra and light curves. This interaction is the characteristic of the supernova class called II_n. These objects are intrinsically rare but are estimated to be dominating the search for gravitationally lensed supernovae, which can be used to determine the local expansion of the Universe, but are these estimations correct? We assume that the rate of these type II_n supernovae is the same for all redshifts, which is not necessarily the case. Join me in exploring the world of type II_n supernovae.

Presenter: COLD, Cecilie (University of Copenhagen)

Contribution ID: 19

Type: **not specified**

Optical Metasurfaces for Lighting Applications

Thursday 25 May 2023 11:55 (15 minutes)

Light-emitting diodes (LEDs) are used in almost all everyday lighting applications today. They enable light sources to have long lifetimes, low power consumption and high light output, while retaining a relatively compact footprint. However, LEDs emit light of equal intensity in all directions, and thus for many applications require bulky external optics to engineer their intensity distribution. We are exploring a way to retain a compact footprint by replacing these bulky optics with so-called metasurfaces. The metasurfaces consist of arrays of resonant, dielectric nanostructures, which introduce a predesigned phase shift to the light passing through the surface. A crucial step is to design the phase profile of the metasurface for a specific application. As a first step, we present an inverse design method for determining the metasurface phase profile, for shaping the intensity of a collimated incident beam. Our model is based on optimal transport from non-imaging optics and is derived from the generalized law of refraction. Authors Kirstine E. S. Nielsen (presenter), Mads A. Carlsen and Søren Raza.

Presenter: ENGELL SANDAGER NIELSEN, Kirstine (Technical University of Denmark)

Contribution ID: 20

Type: **not specified**

Diversity in STEM at Danish Universities

Thursday 25 May 2023 12:30 (30 minutes)

Presenter: Prof. ANDERSEN, Katrine Krogh (University of Copenhagen)

Contribution ID: 21

Type: **not specified**

Dark sector searches at Belle II

Thursday 25 May 2023 13:05 (15 minutes)

The Belle II experiment at the SuperKEKB e^+e^- collider is an upgrade of the B-factory Belle at the KEK laboratory. The main operation started in March 2019 with the aim of collecting an order of magnitude more data than its predecessor Belle. An integrated luminosity of about $\sim 430 \text{ fb}^{-1}$ has been collected so far. Belle II has a unique sensitivity to a broad class of models that postulate the existence of dark matter particles with MeV–GeV masses. \ This talk presents an overview of recent world-leading physics results from Belle II searches as well as near-term prospects for ongoing dark-sector searches.

Presenter: Dr LAURENZA, Martina (Uppsala University)

Contribution ID: 22

Type: **not specified**

Discussion session

Thursday 25 May 2023 14:30 (1 hour)

Presenter: Dr GALL, Christa (Niels Bohr Institute, University of Copenhagen)

Contribution ID: 23

Type: **not specified**

Wrap-up

Thursday 25 May 2023 15:30 (15 minutes)

Contribution ID: 24

Type: **not specified**

Dinner at Copenhagen Contemporary

Wednesday 24 May 2023 19:00 (2 hours)

The conference dinner will take place at Copenhagen Contemporary, Refshalevej 173A, 1432 Copenhagen. A bus service will be available to take all registered participants from the conference venue to the location of the dinner. The bus will leave at 18:15.

Contribution ID: 25

Type: **not specified**

The United Nations Space for Women Initiative

Space research, technology and exploration are now part of our everyday and it is necessary to address the diversity of representation in the decisions on space issues and access to space. In this talk I would like to present the United Nations Office for Outer Space Affairs initiative, Space for Women, with the goal of pushing toward an inclusive, diverse, and equal space sector.

Presenter: Dr FERREIRA, Desiree Della Monica (Technical University of Denmark)

Contribution ID: 26

Type: **not specified**

Optimal geometry for surface-enhanced diffusion

Thursday 25 May 2023 12:10 (15 minutes)

Molecular diffusion in bulk liquids proceeds according to Fick's law, which stipulates that the current is proportional to the conductive area. This constrains the efficiency of filtration systems in which both selectivity and permeability are valued. Numerous studies have demonstrated that interactions between the diffusing species and solid boundaries, e.g., filter pore walls, can enhance or reduce particle transport relative to bulk conditions. To our knowledge, however, only cases that preserved the monotonic relationship between particle current and conductive area are known. Here, we provide examples of the opposite: a class of surface interactions that allows both the selectivity and permeability to increase several-fold as the pore size diminishes. The example is based on the century-old theory of a charged particle interacting with an electrical double layer. This surprising discovery could lead to improvements in the efficiency of filtration and may improve our understanding of biological pore structures. Authors: Anneline H. Christensen, Ankur Gupta, Guang Chen, Winfried S. Peters, Michael Knoblauch, Howard A. Stone, and Kaare H. Jensen.

Presenter: CHRISTENSEN, Anneline Hegelund (Technical University of Denmark)

Contribution ID: 27

Type: **not specified**

Paper blades: Exploring the cutting properties of paper

Thursday 25 May 2023 11:40 (15 minutes)

Paper cuts are a minor nuisance, but they can lead to life-threatening microbial infections. The physical processes that determine whether paper cuts into the skin, however, remain poorly understood. To explore skin-paper interactions, we designed an experiment in which a piece of paper contacts an artificial finger made from ballistic gelatin. Our experiments suggest that the paper thickness is one of the most important parameters in determining cutting efficacy. A relatively thin sheet often buckles before cutting is initiated, whereas the predominant interaction with thick sheets is indentation. Our preliminary data indicate that a successful paper cut is physically impossible outside a relatively narrow range of thicknesses for a given angle. Finally, the optimal paper cut is explored, and the design of an optimal paper-based scalpel is proposed and discussed. Authors Sif Fink Arnbjerg-Nielsen (presenter), Matthew Dominic Biviano, Kaare H. Jensen

Presenter: ARNBJERG-NIELSEN, Sif Fink (Technical University of Denmark)

Contribution ID: 28

Type: **not specified**

Kvinder i Fysik (KIF) General Assembly

Thursday 25 May 2023 16:00 (50 minutes)

All members of KIF (Kvinder i Fysik) are invited to attend the general assembly.

Agenda:

Welcome, choice of moderator, choice of minutes taker

Chairwoman's report

Accounting and budget

Election of board members

Proposals from members

Any other business

Presenter: MALLING, Maren (Kvinder i Fysik (Danmark))

Contribution ID: 29

Type: **not specified**

Early diagnosis of ovarian cancer using e-noses

Thursday 25 May 2023 10:40 (15 minutes)

We present a diagnostic tool that detects ovarian cancer in ten minutes through analysis of blood plasma gas emissions. Due to diffuse symptoms and no available screening tests, ovarian cancer is normally diagnosed in stage III-IV, with a five-year survival rate of only 4% upon diagnosis in stage IV. Stage I detection results in a much better prognosis, with a 5-year survival rate of 90%. Our approach could significantly improve the outlook for patients receiving the diagnosis. The method is based on an electronic nose coupled with AI. 32 commercial gas sensors are configured in 4 banks with 8 sensors each, operating at different temperatures. Blood plasma is placed into a sample holder which is inserted into the e-nose at the start of a measurement. Data is collected at a sampling rate of 10 Hz for 600 seconds, after which an AI derived classification algorithm based on PCA for dimensionality- and feature reduction and an SVM model provides a positive or negative output. Using 5-fold cross validation, we have obtained a sensitivity of 98% and an overall accuracy of 95 % based on 113 samples, including 87 samples from ovarian cancer patients with conditions ranging from borderline to stage IV.

Presenter: Dr ERIKSSON, Jens (Linköping University)

Contribution ID: **30**

Type: **not specified**

Diversity initiatives at the Niels Bohr Institute

Wednesday 24 May 2023 13:10 (10 minutes)

Presenter: Prof. MATHIESEN, Joachim (Niels Bohr Institute, University of Copenhagen)