FKF Physics Section 2021-2025 Strategy Document

Background

Physics is a foundational and highly interdisciplinary field of research at the Natural Science Faculty and the FKF physics section members have established or co-established a number of interdisciplinary and interdepartmental centers and networks including the Danish IAS, CP3-Origins, PhyLife, FLinT and SDU Galaxy. Physics research is also embedded and dispersed across campuses and faculties at SDU.

- Acoustics, Mechanics, Nano optics and Quantum optics is embedded at the Technical Faculty.
- Computational Lattice Quantum Field Theory and Quantum Mathematics is embedded at IMADA.
- Medical Physics is embedded at the Faculty of Health
- Physical Chemistry is embedded in the Chemistry and Pharmacy section.

As such the section is already highly involved in interdisciplinary research and education collaborations and intends to continue and strengthen this.

The cand. scient degree education in physics that supplies the students and researchers to these university wide research programmes is offered and administered by FKF, while a joint first year with the civil engineering degree in physics & technology is coordinated with the technical faculty.

The above dispersion of research poses unique opportunities and challenges for the faculty of natural science and the institute in promoting the physics education.

FKF Physics Section

The faculty & research, teaching and recruitment strategy of the FKF physics section 2021-2025 is focused on strengthening three core areas in the section.

• Fundamental Physics

Cosmology, Gravity, Astroparticle Physics, Particle Physics

Biological and soft-matter physics:

Soft condensed matter, Self-organized matter: Membranes and Liquid crystals, Bio(medical) physics.

Modelling and computational physics

Biophysical simulations, polymer physics, evolutionary ecology and socio-technical simulations, Event Horizon Telescope and gravitational-wave simulations, physics guided machine learning and Artificial Intelligence

Strategy Goals

The primary goal of this 5-year strategy is

to achieve, maintain and develop an internationally leading position in research and education within the three defined core areas.

The companion goals of the strategy are

To ensure that SDU physics activities in their entirety, as summarized above, is contributing effectively to the visibility of the physics education at FKF.

To ensure that the support and promotion of the physics section are central to the faculty and universitiy strategy.

To ensure the valid integration of the physics section into the departmental activities within the Faculties of Science and of Technology

Strategy Foci

i) Expanding the ongoing collaboration with other departments in a number of areas and ensuring the physics section is not underutilized in teaching these areas:

IMADA - HPC, Quantum Field Theory, physics guided data analysis,

TEK - Physics education, SDU Galaxy,

Health – Medical physics and the hospital physics education.

KeFA section of FKF – physical chemistry.

ii) A mutually beneficial collaboration with TEK on a strong joint first year physics education and increased recruitment to this education as well as visibility of SDU physics education.

iii) Ensuring that students trained by the physics section remain a sought after ressource in international research and companies.

iv) Ensuring that research excellence in the section is actively and vigorously promoted on SDU platforms.

v) Ensuring a stronger representation of the FKF physics section interests in local, national and international boards and foundations of relevance.

Requirements

A number of initiatives, commitments and investments at section, institute and faculty level are needed to reach these goals, most importantly:

An increase in faculty members in the section.

An increase in available research time and support for each faculty member in the section.

Increased support for recruitment to the physics education.

In turn this hinge on an increase in economic volume achievable via investments in the section and the resulting increased turnover from external grants and student uptake.

A faculty and university wide coordination of SDU physics strategy.

Strategy action items:

Research:

A plan for retainment and career development of current faculty.

A plan and timeline for faculty recruitment of tenured senior and non-tenured junior faculty postions.

A plan of action for obtaining the conditions required for securing and sustaining at least one DNRF scale center in the section or significant participation in similar scale centers within the next 5 years.

An international SDU physics wide colloquium series.

Education:

Establishing 2 international competitive masters specializations in the areas of i) fundamental physics and ii) biological physics and soft matter. Collaboration with other departments where relevant.

Strengthening computational physics and physics guided data science as an integrated part of the general physics educations and the 2 (envisioned) + 1 (existing) specializations. i) fundametal physics, ii) biological and soft matter physics iii) existing astronomy/astrophysics specialization. In collaboration with other departments and business where relevant.

Establishing a Physics Business club for promoting SDU students towards businesses and codeveloping projects and our education.

Increasing the service teaching provided by physics at the University and working to ensure attractive 2 subject educations with physics as one part.

Public lecture series

Recruitment and press:

Hiring of a recruitment and outreach coordinator dedicated to the physics section.

A dedicated physics recruitment and outreach team and webpage established.

A critical evaluation of the visibility of the FKF physics section and SDU physics as a whole on SDU platforms towards high school teachers' students and funding agencies.

A Physics Tour program with yearly online or on-site visits by students and faculty to all relevant Stx/Htx schools in the Southern Denmark Region.

Consolidation of the central components of the section's recruitment efforts: FysikLab and the Physics Club.

A mentoring and coaching program for students participating in the sections outreach activities including FysikLab, Physics Tour and Physics Club.

A restarted talent program from 2nd year to supplement the 1st year student mentoring program.

The coordination with and capitalization on the breadth of SDU physics research must be increased to increase student recruitment to the physics education at FKF.

Implementation

HD and DHD resposible for timely identification of international, national, SDU, NAT, and FKF opportunities as well as risks and obstacles for the implementation and realization of the proposed strategy.

HD and DHD are resposible for raising and resolving obstacles and issues internally at SDU.

DHD responsible for for daily implementation of the strategy.

DHD, Head of education and outreach responsible will define sub-groups with specific focus on teaching, outreach and recruitment strategy.

Monthly section meetings will include regular review on progress towards realization of the strategy on specific items.

Bi-annual Status meetings on strategy status and development are called by DHD. One of these will have status of retreat, possibly joint with FKF.

Status document will be shared and updated internally at FKF, and with the Dean of Natural science.