

BASIC INFORMATION ON SUB-PROJECT

NAME OF PROGRAMME/FUND	Scholarship Fund - Sciex NMS ^{ch}
RESEARCH FIELD AND OTHER RESEARCH FIELDS INVOLVED (if applicable)	Mathematics, Physics
TITLE OF THE SUB-PROJECT	Spectral Operators in Mathematical Physics (SpOMp)
REGION OF THE CZECH REPUBLIC (according to the location of the home institution)	Prague
GRANT AMOUNT SPENT	99 059,32 CHF
INTERMEDIATE BODY	Swissuniversities
HOME INSTITUTION	Academy of Sciences Czech Republic Nuclear Physics Institute
HOST INSTITUTION	Universität Bern Mathematisches Institut
NAME OF THE FELLOW	Petr Siegl

ABSTRACT OF THE SUB-PROJECT

The project is aiming at mathematical studies of non-self-adjoint problems coming from modern physics, with special emphasis put on rigorous justifications. The non-self-adjoint theory is extremely diverse, it comprises a collection of advanced methods and it is difficult, if not impossible, to find a common thread. Nonetheless, we believe that the theory of spectral operators possesses the unifying features and it seems to be natural that physically motivated models can be described by this class of operators. Our goal is to apply abstract theory together with recent results coming from different approaches used in branches of mathematics and physics where non-self-adjoint problems are encountered in various contexts, with different goals and techniques. We believe that progress in solving the proposed problems will contribute also to a collection of more general and abstract results in non-self-adjoint theory.

The project is particularly concerned with the investigation of spectral problems coming from fluid dynamics, non-local effects described by local differential operators, and reflectionless scattering. From the mathematical point of view, the project is intended to examine the spectrality of operators coming from certain areas of mathematical physics, the structure of similarity transformations to the “canonical” form, reasons of violating spectrality, spectral/basis effects on the boundary of spectrality and understanding of limit cases, estimates of eigenvalue asymptotics. The Czech team has a strong experience in mathematical physics (quantum waveguides and graphs, open systems, relativistic quantum equations), while the Swiss team has great expertise in non-selfadjoint (systems of) differential operators. Both teams have successfully worked on non-self-adjoint operators (Krein spaces, C -symmetric operators, PT -symmetric operators). The proposed mutual exchange of experience and ideas of the more physically oriented Czech team and the more mathematically oriented Swiss team is expected to lead to a fruitful cooperation in this joint project.

MAIN RESULTS

DATE OF REALISATION OF THE FELLOWSHIP	1.3.2013 - 28.2.2014
MORE INFORMATION ON THE PROGRAMME	www.sciex.ch