

# SCHWAEMM and ESCH: Lightweight Authenticated Encryption and Hashing using the SPARKLE Permutation Family

– Submission to the NIST Lightweight Cryptography Standardization Process –

Christof Beierle<sup>1</sup>, Alex Biryukov<sup>1</sup>, Luan Cardoso dos Santos<sup>1</sup>, Johann Großschädl<sup>1</sup>,  
Léo Perrin<sup>2</sup>, Aleksei Udovenko<sup>1</sup>, Vesselin Velichkov<sup>3</sup>, and Qingju Wang<sup>1</sup>

<sup>1</sup>SnT and CSC, University of Luxembourg, Luxembourg

<sup>2</sup>Inria, Paris, France

<sup>3</sup>University of Edinburgh, U.K.

Submission name:

SPARKLE

Corresponding submitter:

Prof. Dr. Alex Biryukov

Email: [alex.biryukov@uni.lu](mailto:alex.biryukov@uni.lu)

Phone: +352 466644-6793

University of Luxembourg

Maison du Nombre, 6, Avenue de la Fonte,

L-4364 Esch-sur-Alzette,

Luxembourg

Contact email for the whole SPARKLE group:

[sparklegrupp@googlegroups.com](mailto:sparklegrupp@googlegroups.com)

Homepage of SCHWAEMM, ESCH and SPARKLE:

<http://cryptolux.org/index.php/Sparkle>