Encryption Algorithm Rocca-S

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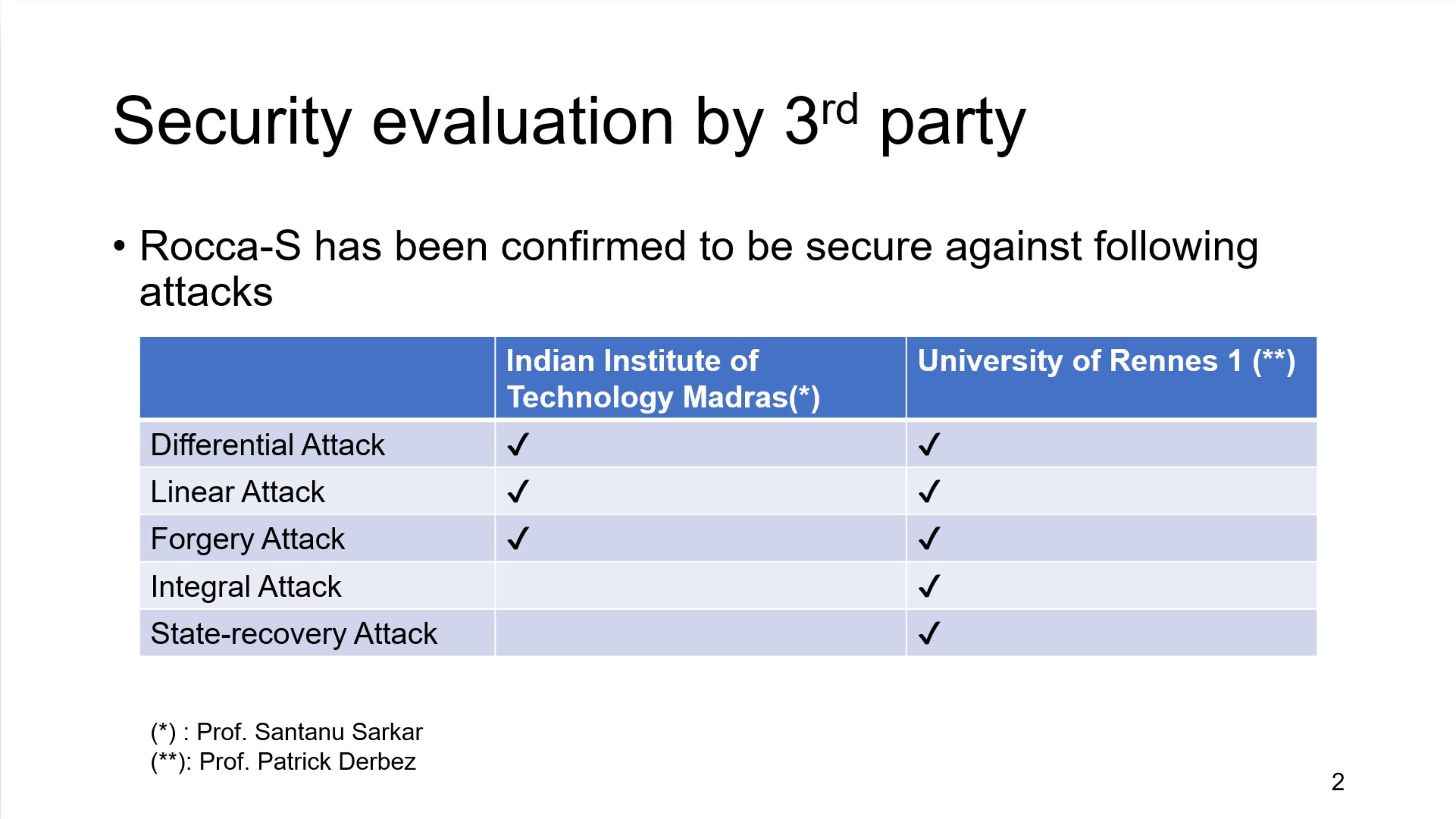
Rocca-S

- Design
  - Sponge-based construction
  - 256-bit key and 256-bit tag
  - Three modes: AEAD, encryption only and keystream generation
- Security (in nonce respecting setting)
  - Classical setting: 256-bit security against key-recovery and 192-bit security against forgery
  - Quantum setting: 128-bit security against key-recovery and forgery
- Internet draft: https://datatracker.ietf.org/doc/draft-nakano-rocca-s/
- The paper is presented at ESORICS 2023

Security evaluation by 3rd party

(presented at IETF 116)



Security evaluation by 3rd party

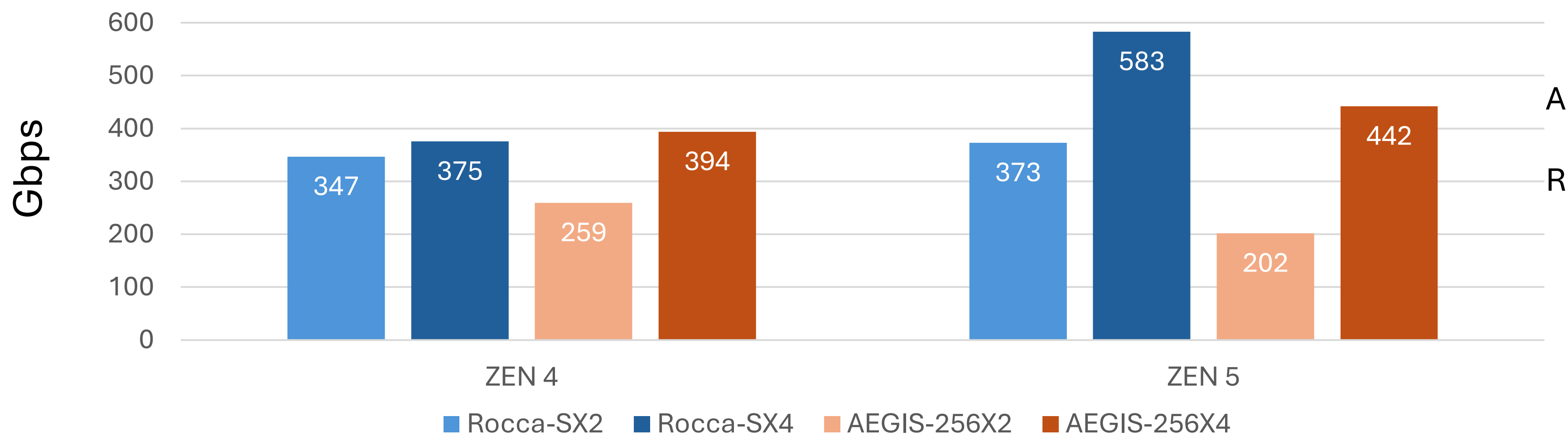
- Rocca-S has been confirmed to be secure against following attacks

	Indian Institute of Technology Madras(*)	University of Rennes 1 (**)
Differential Attack	✓	✓
Linear Attack	✓	✓
Forgery Attack	✓	✓
Integral Attack		✓
State-recovery Attack		✓

(*) : Prof. Santanu Sarkar
(**): Prof. Patrick Derbez

Rocca-SX

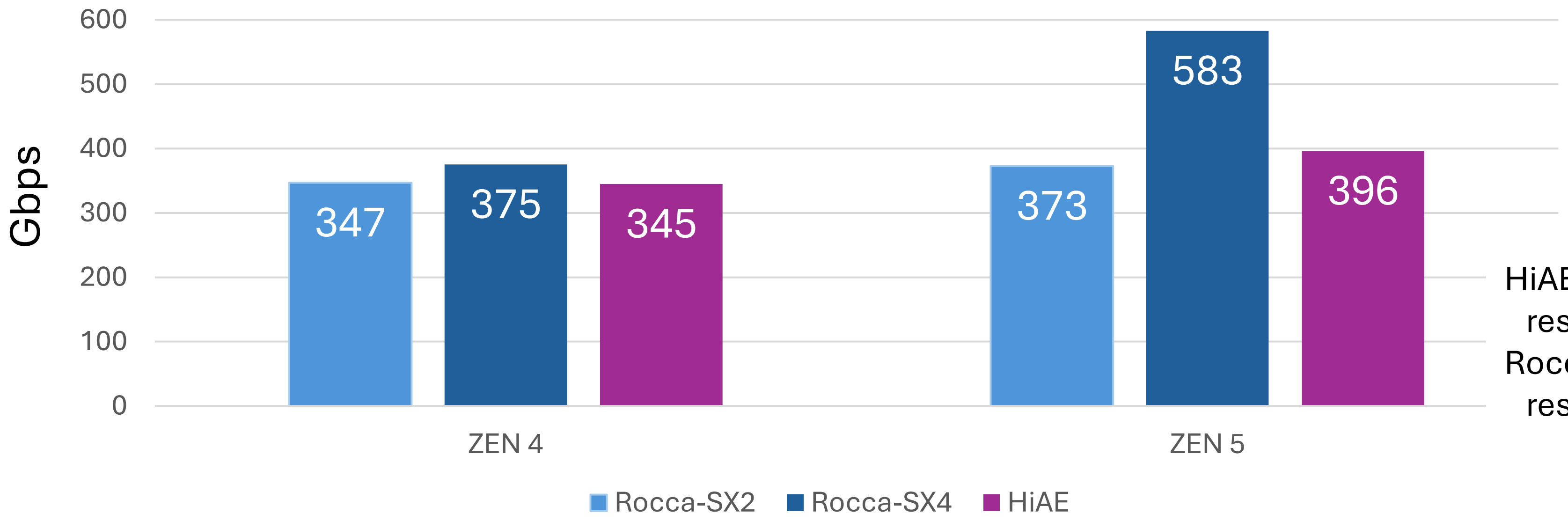
- Parallel modes of Rocca-S for higher performance
  - Rocca-SX2: 2 parallel lanes
  - Rocca-SX4: 4 parallel lanes
  - Same construction as AEGIS-256X2 and AEGIS-256X4
- Performance comparison with AEGIS family



AEGIS family:
results using libaegis benchmark
Rocca-S family:
results using “openssl speed -aead”

Comparison with HiAE

- HiAE is another AEAD aiming high throughput
- HiAE requires 2048-bit of internal state, which is similar to 1792-bit of Rocca-SX2



HiAE:
  results using official benchmark
Rocca-S family:
  results using "openssl speed -aead"

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