Overview of the 2009-2010 'DPA contest v2'

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What is this http://www.DPAcontest.org/v2/?

- As the v1, it is a **key recover attack** contest
- **More than 1,000,000 side-channel measurements** (*traces*) are freely available worldwide from a PostGreSQL database.
- NIST AES 128-bit parallel block cipher encryption,
- SASEBO-GII board,
- Clock signal is **stable**: traces **synchronization** is perfect,
- Measurement bandwidth is **5 GHz**, and sampling rate is **5 Gsample/s**. The oscilloscope is configured to average the traces 128 times. The FPGA runs at 24 MHz and there are 3253 samples per trace. Thus, we have:
  - 208.333 samples per clock, and
  - 15.6 clocks per trace (*i.e.* more than the 10 rounds).
- Vertical resolution is **8.0 effective bits** (no averaging).

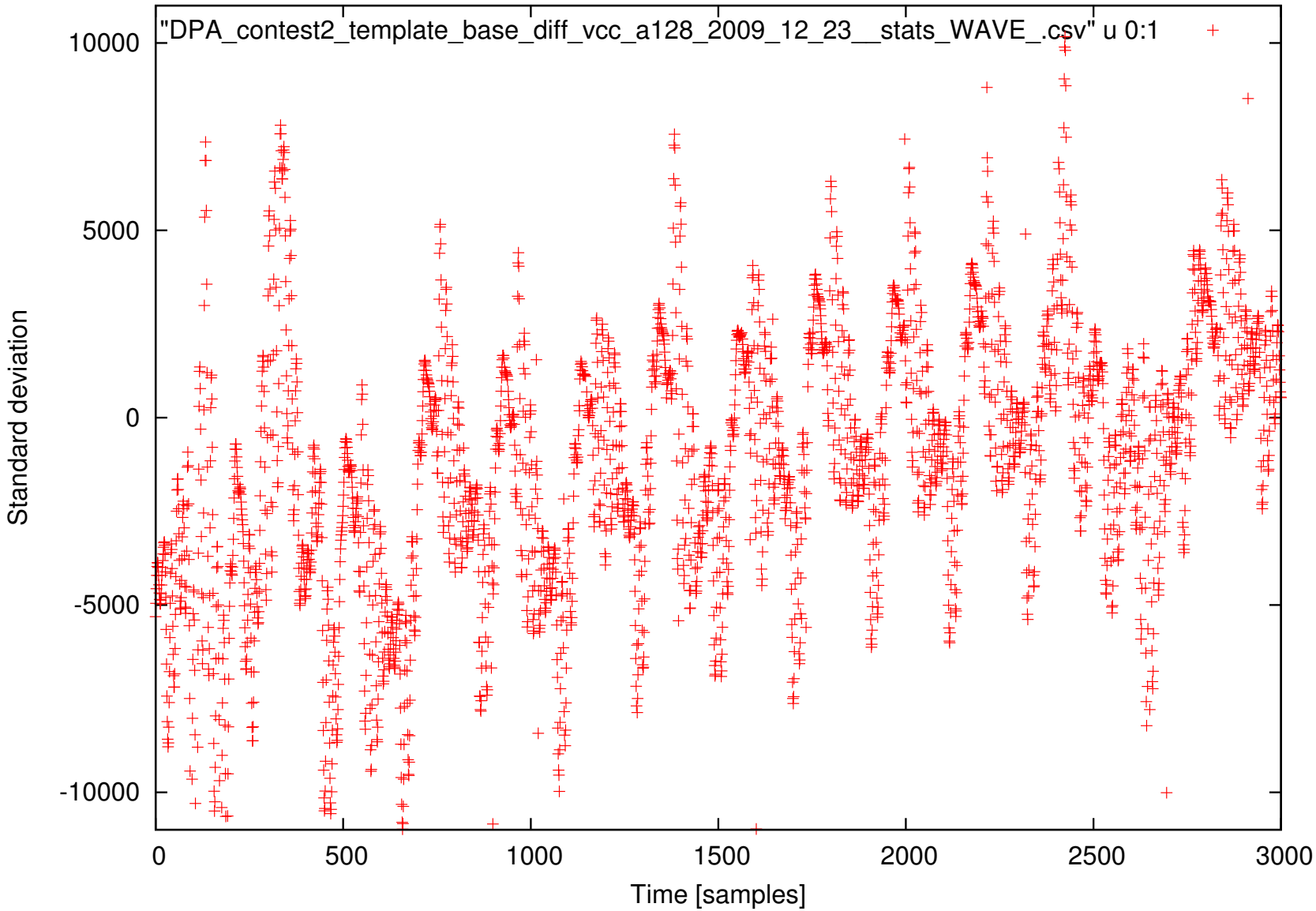
Specificity of this second edition

- Profiling is permitted.
- Evaluation using built-in success rate and guessing entropy metrics.

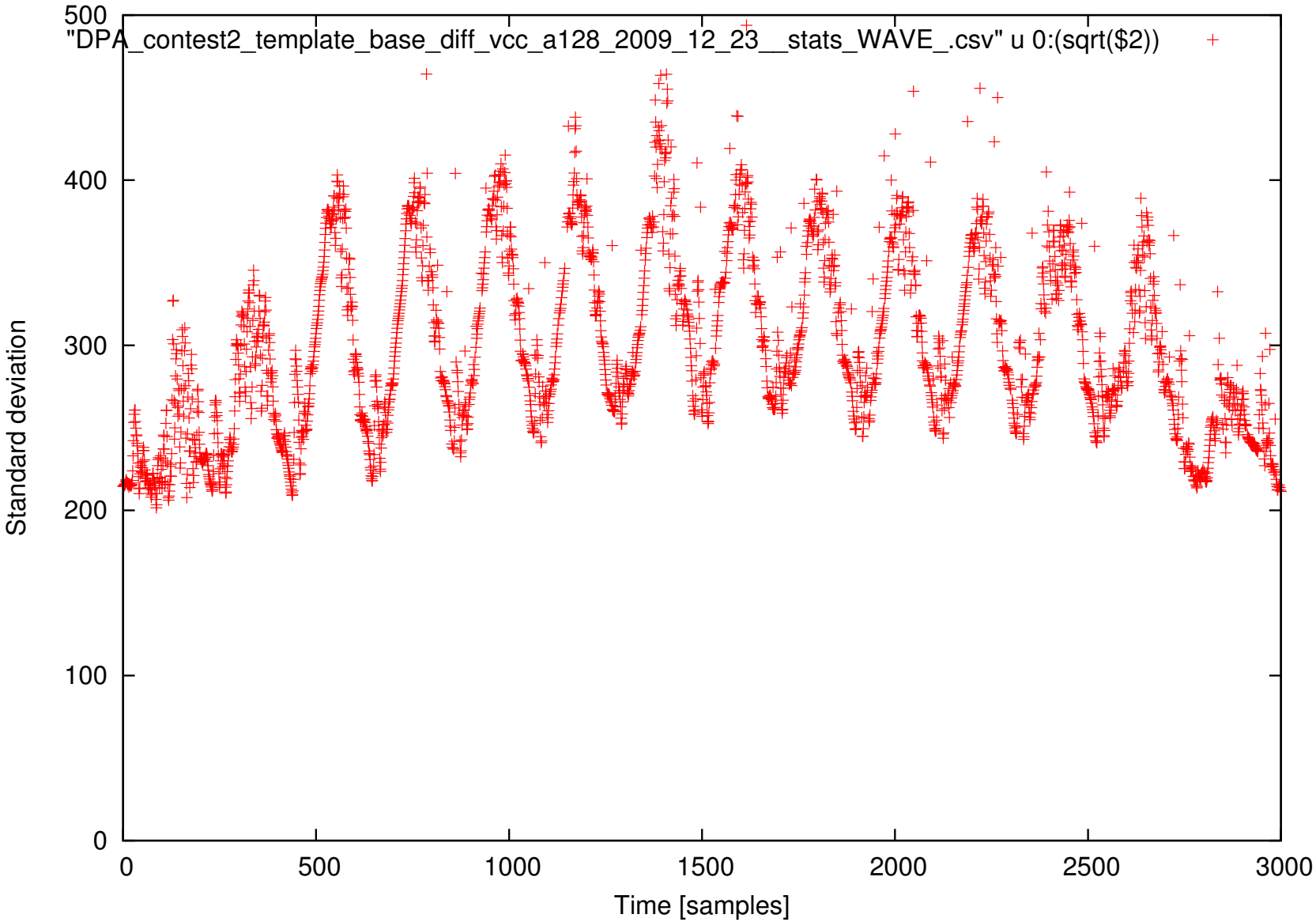
Training	**Matching (public)**	**Matching (private)**
1,000,000 traces	—	—
—	$32 \times 20{,}000$ traces	—
—	—	$32 \times 20{,}000$ traces

Signal / Noise ratio: ≈ 0.0078.

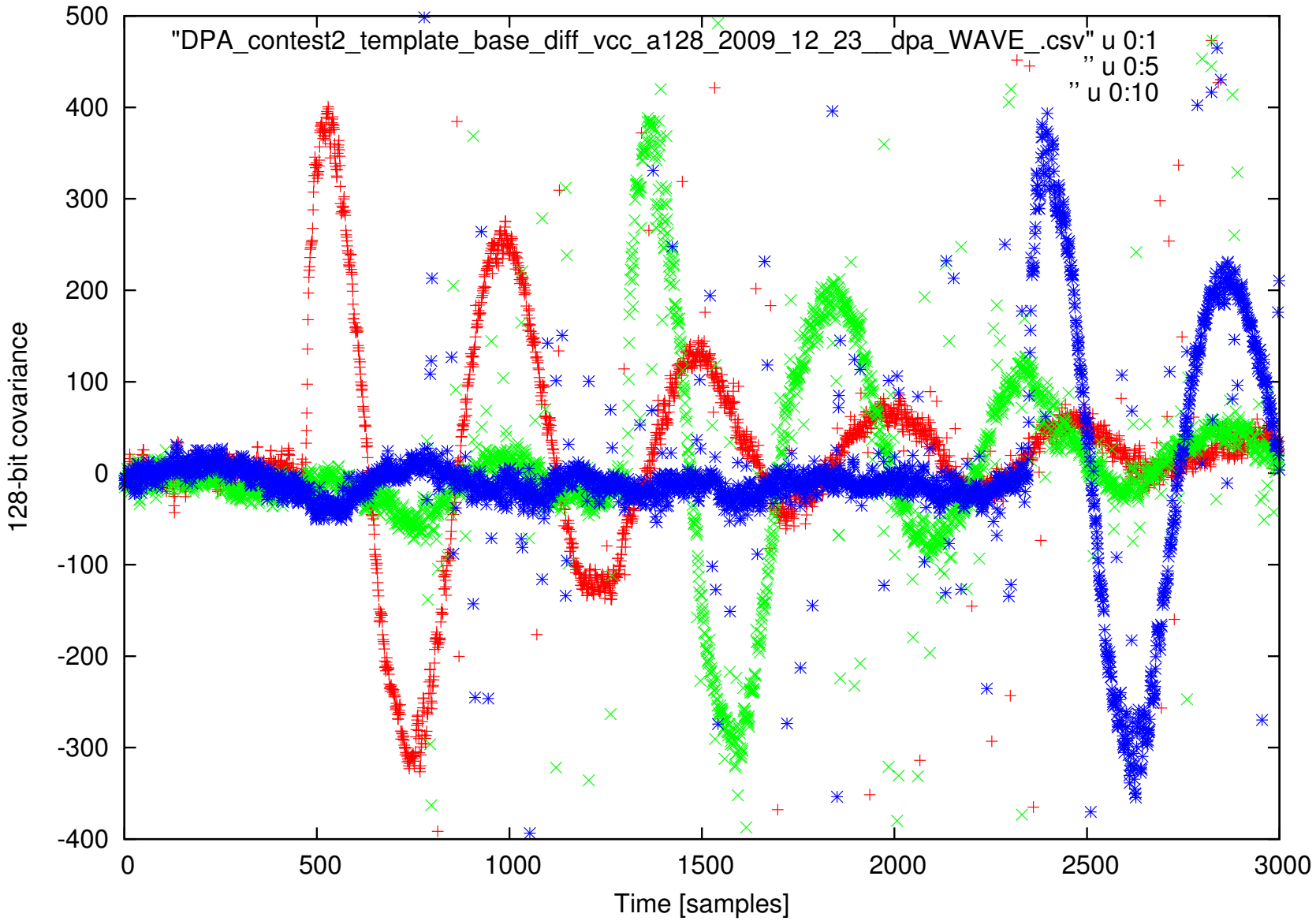
Average curve



Standard Deviation curve



128-bit covariance curve
(Hamming distance model for rounds 1, 5 & 10)



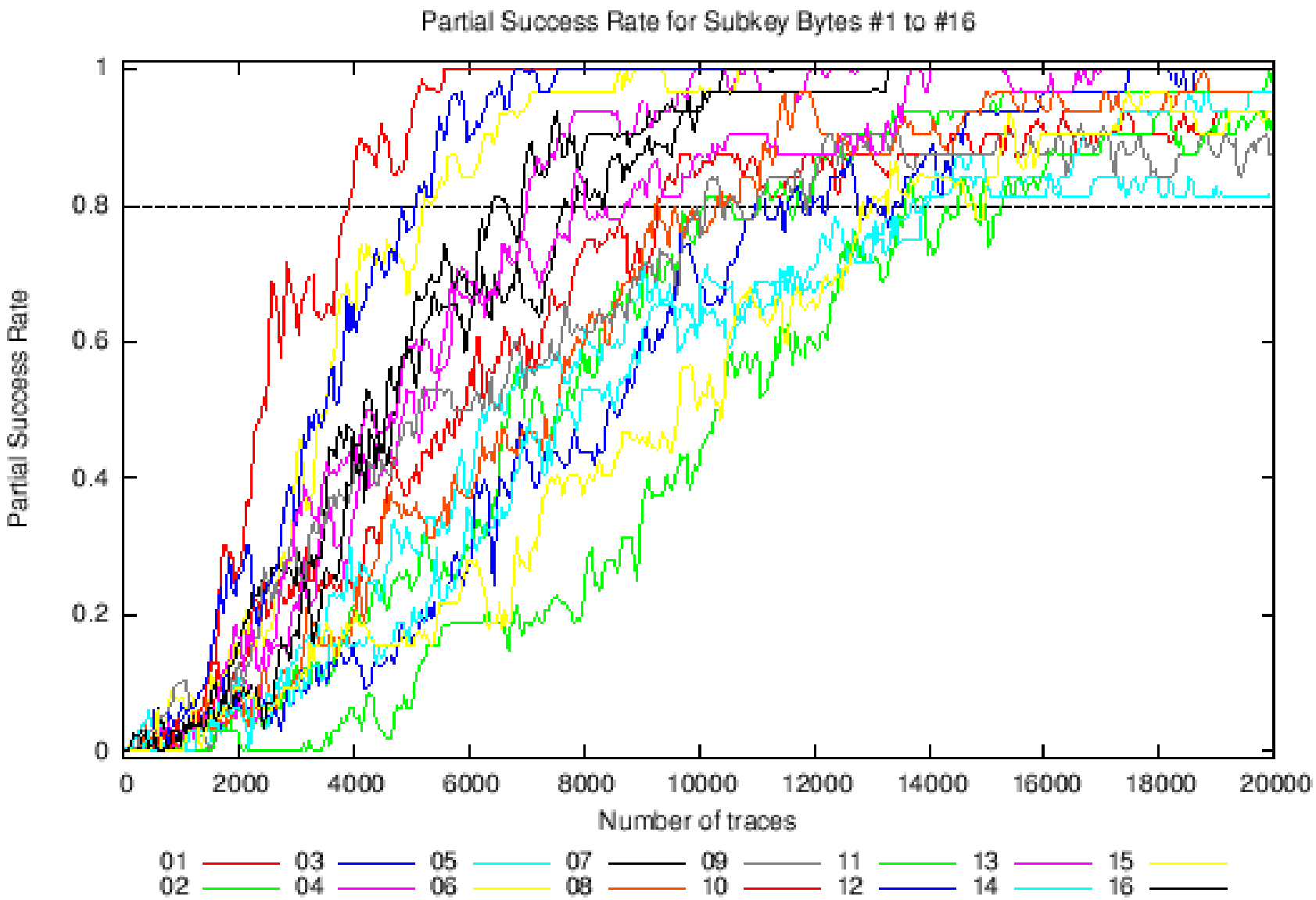
Participants

Author	Affiliation	Attacks #
Thanh-Ha LE	MORPHO, France	2 attacks
Maël BERTHIER	MORPHO, France	1 attack
Alexis BONNECAZE	IML, ERISCS, France	6 attacks
Jeremy ABIHSSIRA & Céline THUILLET	EADS Defence & Security, France	1 attack
Daisuke NAKATSU	University of Electro-Communications, Japan	1 attack
Antoine WURCKER	UNILIM, Faculté des Sciences et Techniques de Limoges, France	2 attacks
Edgar MATEOS	University of Waterloo, Canada	1 attack
Matthieu WALLE	Thales Communications, France	4 attacks
Aziz M. ELAABID	University Paris 8 and TELECOM-ParisTech	1 attack
Reference attack	TELECOM-ParisTech	1 attack

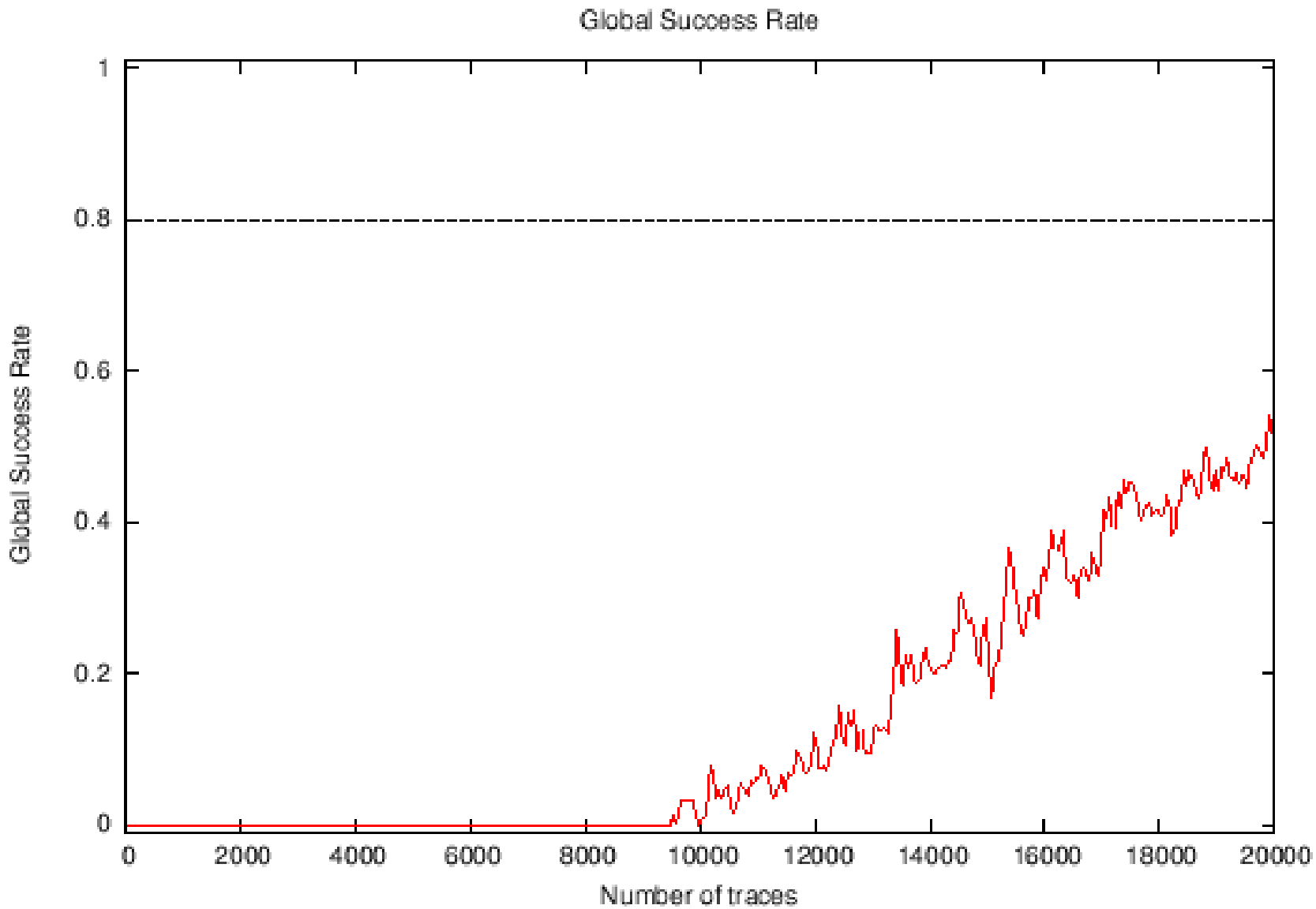
How your attack is processed?

- You get a 25-page PDF with an exhaustive security evaluation
  - comes with the figures and LaTeX source code:
  - $\Rightarrow$ directly reusable for publications.
- Partial/global success rate
- Partial guessing entropy

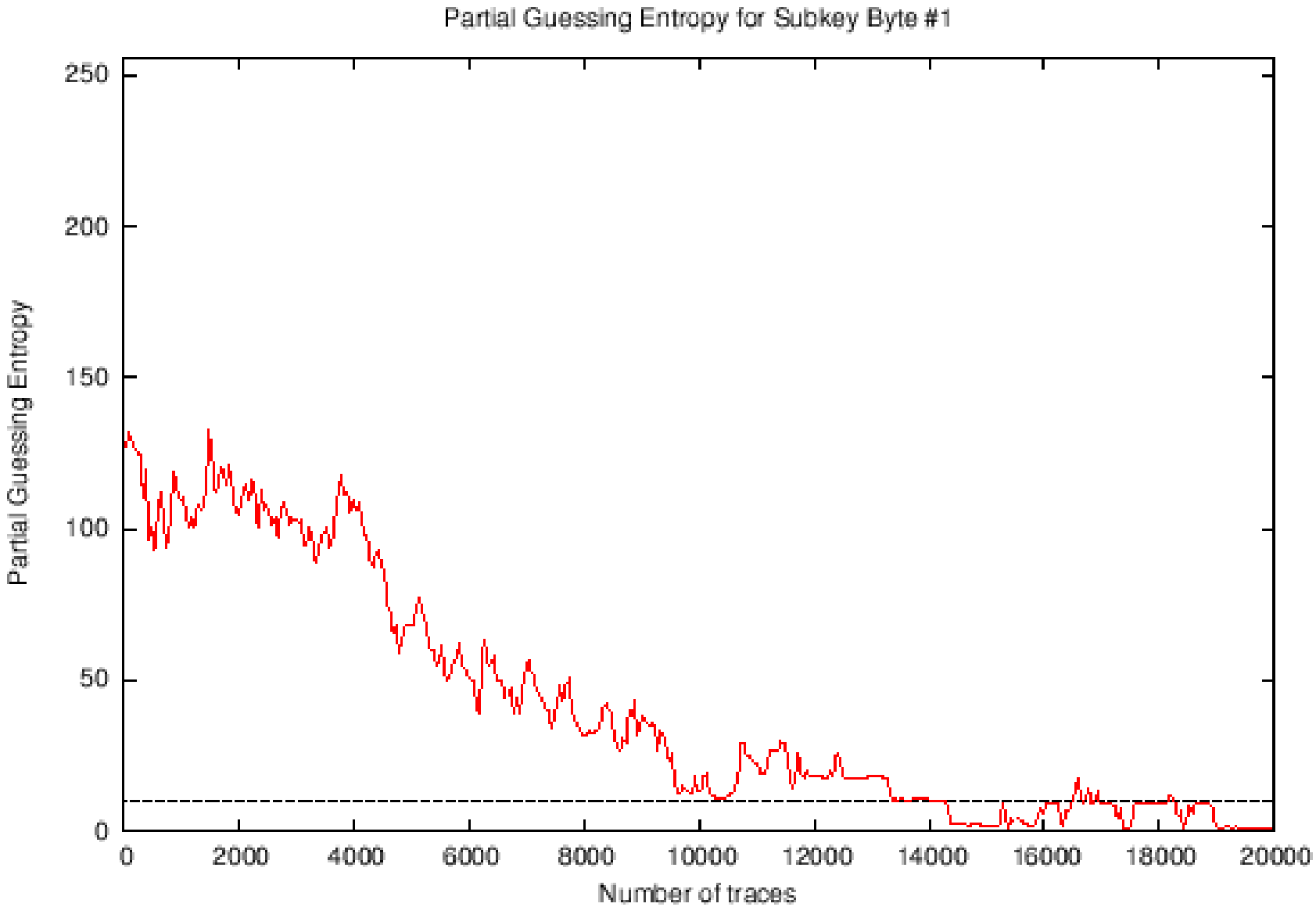
Partial success rate



Global success rate



Partial guessing entropy



Some Results

Attack	GSR >80%	Min PSR >80%	Max PGE <10	GSR stable >80%	Min PSR stable >80%	... ...
Reference	F	13,876	F	F	15,316	...
Template	F	F	F	F	F	...
A. Bonnecaze, IML ERISCS DPA	F	F	9 561	F	F	...
A. Bonnecaze, IML ERISCS SPE	17 340	11 818	5 908	18 458	12 318	...
A. Bonnecaze, IML ERISCS VAR	F	F	18 938	F	F	...
A. Bonnecaze, IML ERISCS VDPA	F	F	15 191	F	F	...
A. Bonnecaze, IML ERISCS CVM	F	F	15 516	F	F	...
A. Wurcker, UNILIM A	13 474	11 501	4 179	19 858	12 631	...
A. Wurcker, UNILIM B	F	11 525	4 179	F	12 866	...

... ...	Max PGE stable<10	GSR 20k	Min PSR 20k	Max PSR 20k	Min PGE @20 k	Max PGE 20k	Time per Trace
...	F	0.53	0.81	1.00	1.00	40.25	1.10 s
...	F	0.19	0.35	1.00	1.00	37.84	0.05 s
...	9 629	0.41	0.75	1	1	1.72	0.00 s
...	6 262	0.88	0.94	1	1	1.06	0.83 s
...	19 631	0.53	0.69	1	1	9.16	0.00 s
...	17 646	0.25	0.53	1	1	5.22	0.00 s
...	17 526	0.44	0.69	1	1	6.56	0.31 s
...	4 192	0.81	0.88	1	1	1.16	0.25 s
...	4 192	0.69	0.88	1	1	1.16	0.25 s

F = Fails.

Opinion's pool

If we let part:

- *Automatic spam* and
- *human SQL injection* attempts,

there are those real issues left:

- Attacks' language standardization not completed: (C++, C#, matlab);
- Industrial worried about submitting code;
- Access to the database uneasy.

What's next?

- Final debriefing at COSADE'2011, in January/February at Darmstadt.
- Remember that participants to the DPA contest 2nd edition are eligible for a free SASEBO GII board.
- 3rd edition:
  - Acquisition contest in parallel to the attack contest
  - Protected implementation
  - Opinion pool for the type of countermeasure