Just a little of that human touch

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CRYPTO 2014 rump session

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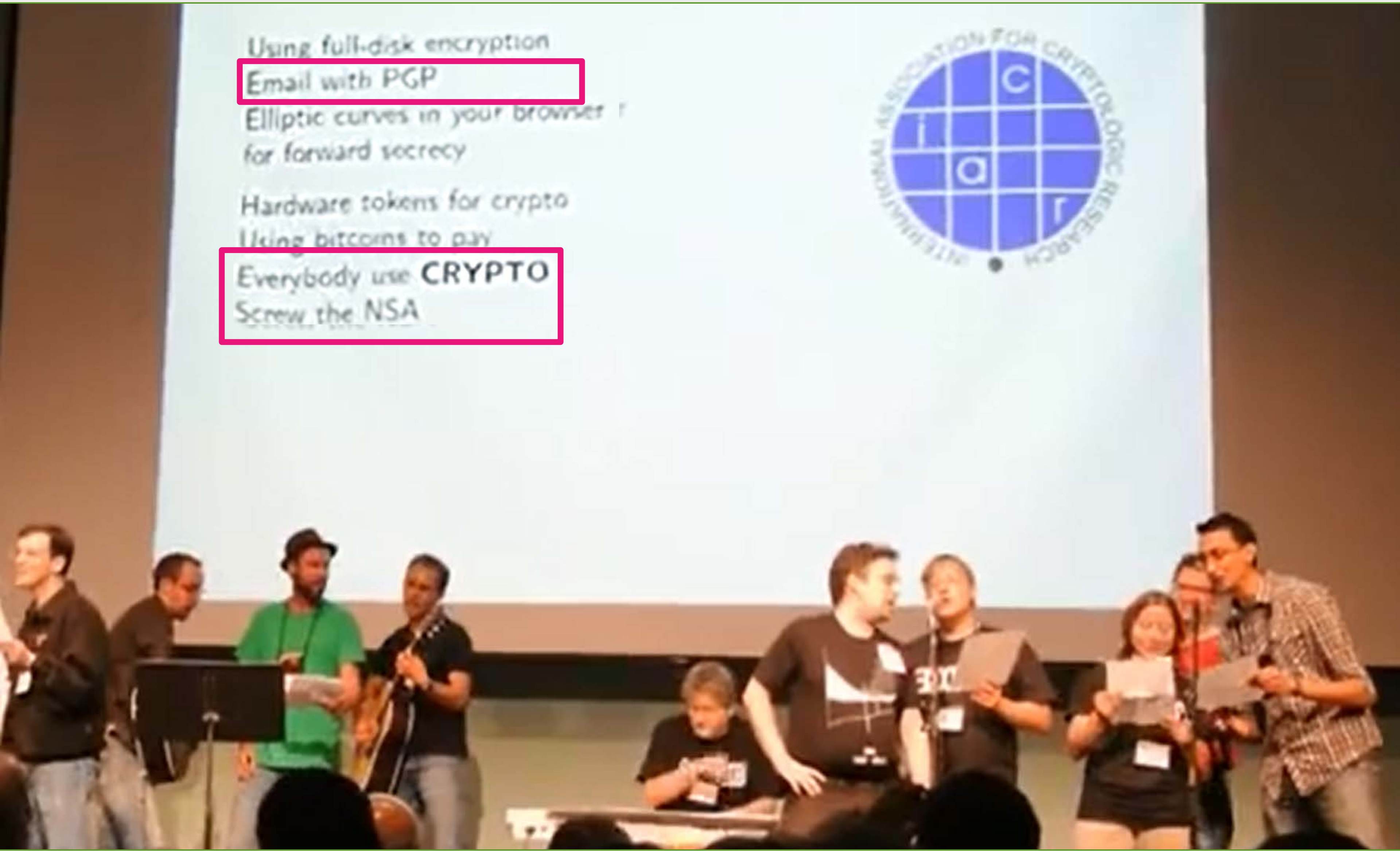
CRYPTO’13 rump session post-Snowden advisory



Using full-disk encryption

Email with PGP

Elliptic curves in your browser !
for forward secrecy

Hardware tokens for crypto

Using bitcoins to pay

Everybody use **CRYPTO**

Screw the NSA

Earlier: acoustic cryptanalysis

RSA 4096-bit key extraction using microphones

Sound propagation is limited in range and frequency.
What other channels are out there?

Power? Electromagnetic?

- PCs:
  - Multi-GHz clockrate
  - Many electrically noisy electronics
  - Limited physical access
- Full-bandwidth attacks are hard

- **Low-bandwidth attacks work!**
  But unwieldy:
  - **Power analysis**
    requires disconnecting the target from its power supply
  - **Electromagnetic analysis**
    has short range, fiddly antenna placement

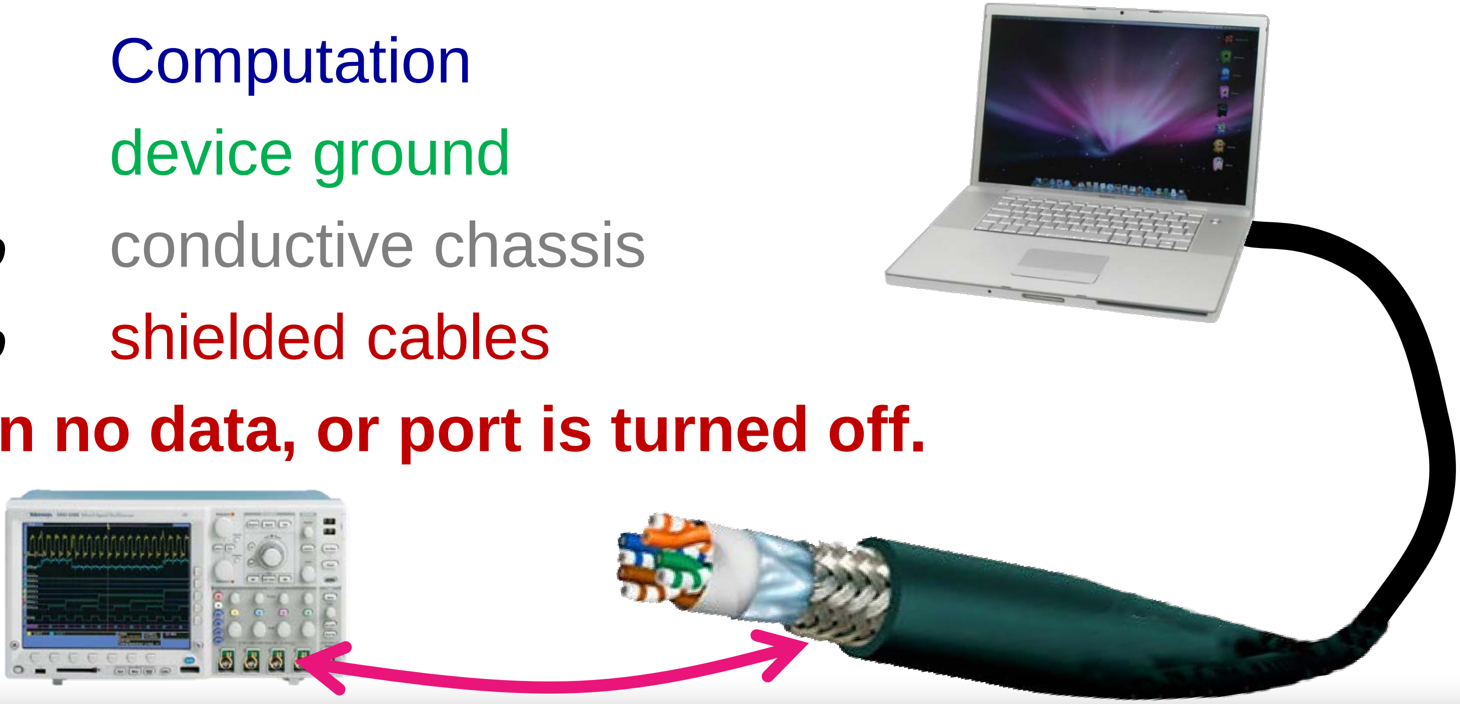
Ground-potential analysis

- **Attenuating EMI emanations**
  “Unwanted currents or electromagnetic fields? Dump them to the circuit ground!”
  (Bypass capacitors, RF shields, …)

- Device is grounded, but its “ground” potential fluctuates relative to the mains earth ground.

	Computation
affects	device ground
connected to	conductive chassis
connected to	shielded cables

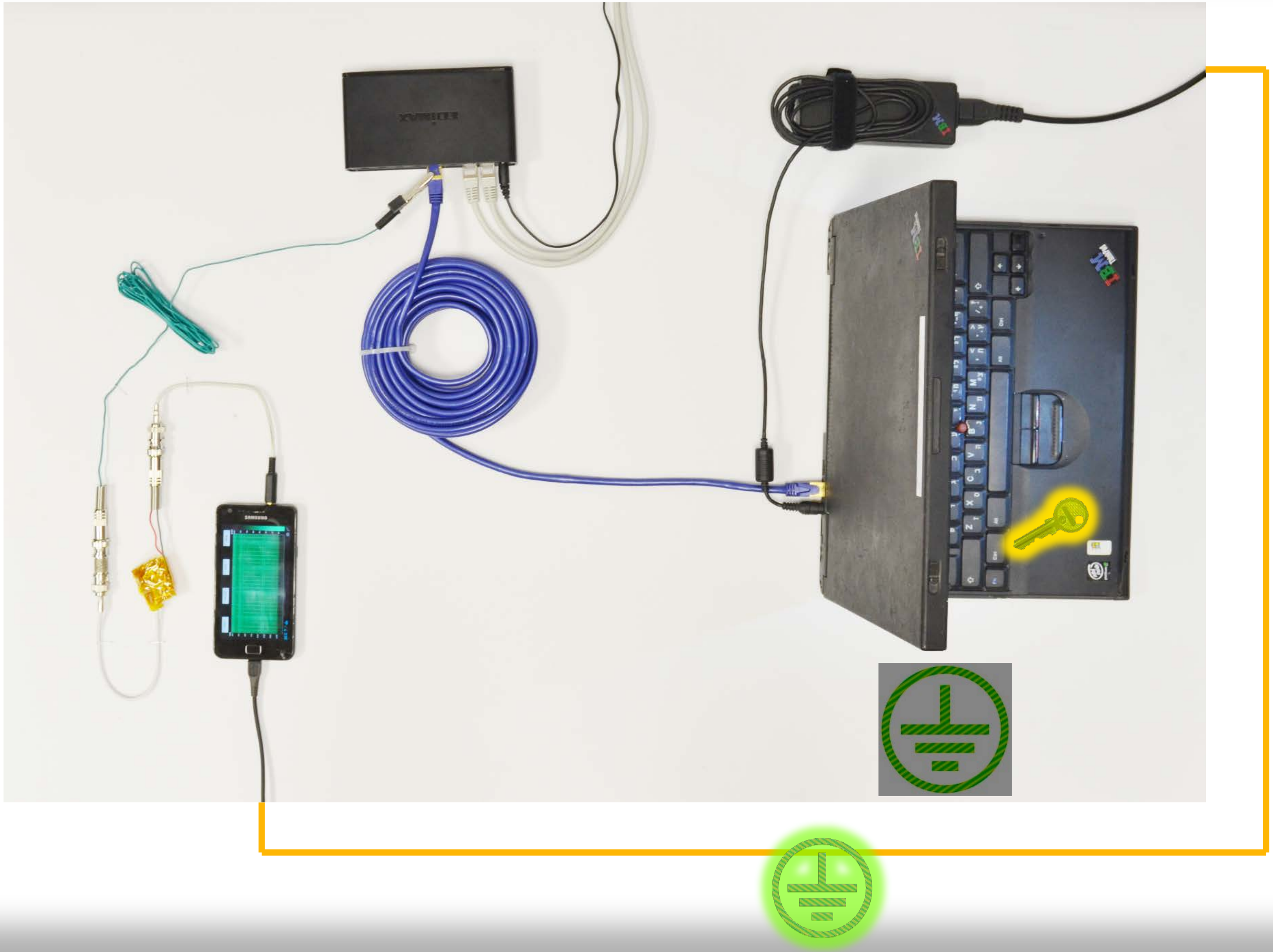
Even when no data, or port is turned off.



Live demo

- Meanwhile, on the other side of the VGA cable…
- Human touch key-extraction
- Luchtime attack
- Equipment

Key extraction on far side of Ethernet cable using a mobile phone

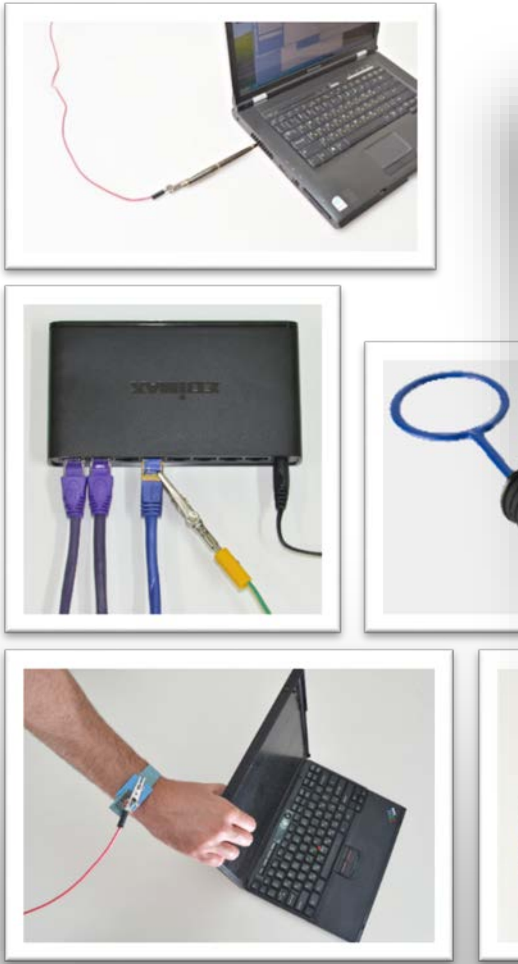


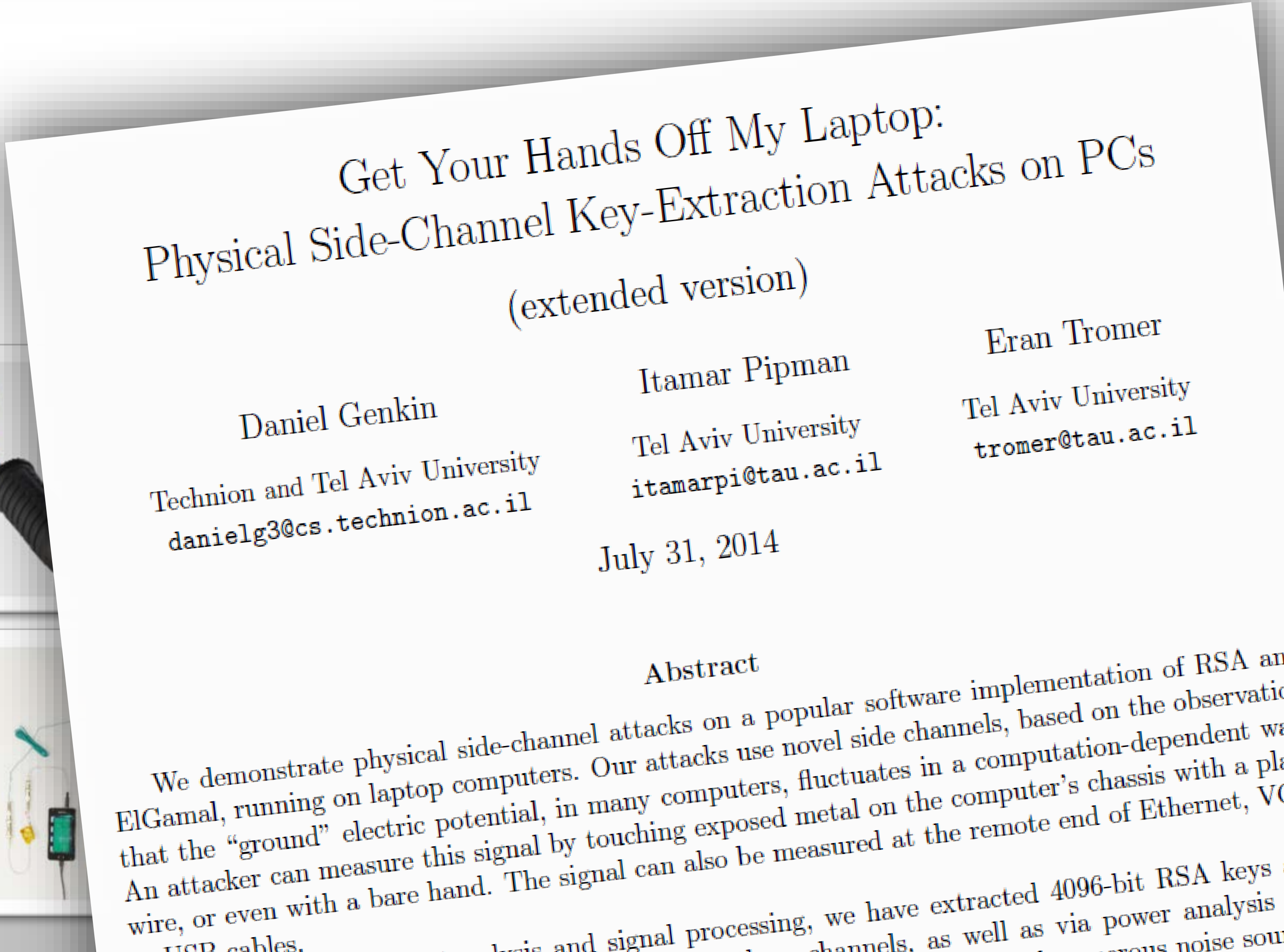
www.tau.ac.il/~tromer/handsoff

Rejected from ePrint. Accepted to CHES 2014.

CVE-2014-5270

RSA, ElGamal key extraction from GnuPG in a few seconds.





Get Your Hands Off My Laptop: Physical Side-Channel Key-Extraction Attacks on PCs

(extended version)

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Abstract

We demonstrate physical side-channel attacks on a popular software implementation of RSA an
ElGamal, running on laptop computers. Our attacks use novel side channels, based on the observatio
that the "ground" electric potential, in many computers, fluctuates in a computation-dependent wa
An attacker can measure this signal by touching exposed metal on the computer's chassis with a pla
wire, or even with a bare hand. The signal can also be measured at the remote end of Ethernet, VG
USB cables.

lysis and signal processing, we have extracted 4096-bit RSA keys
channels, as well as via power analysis
rous noise sou