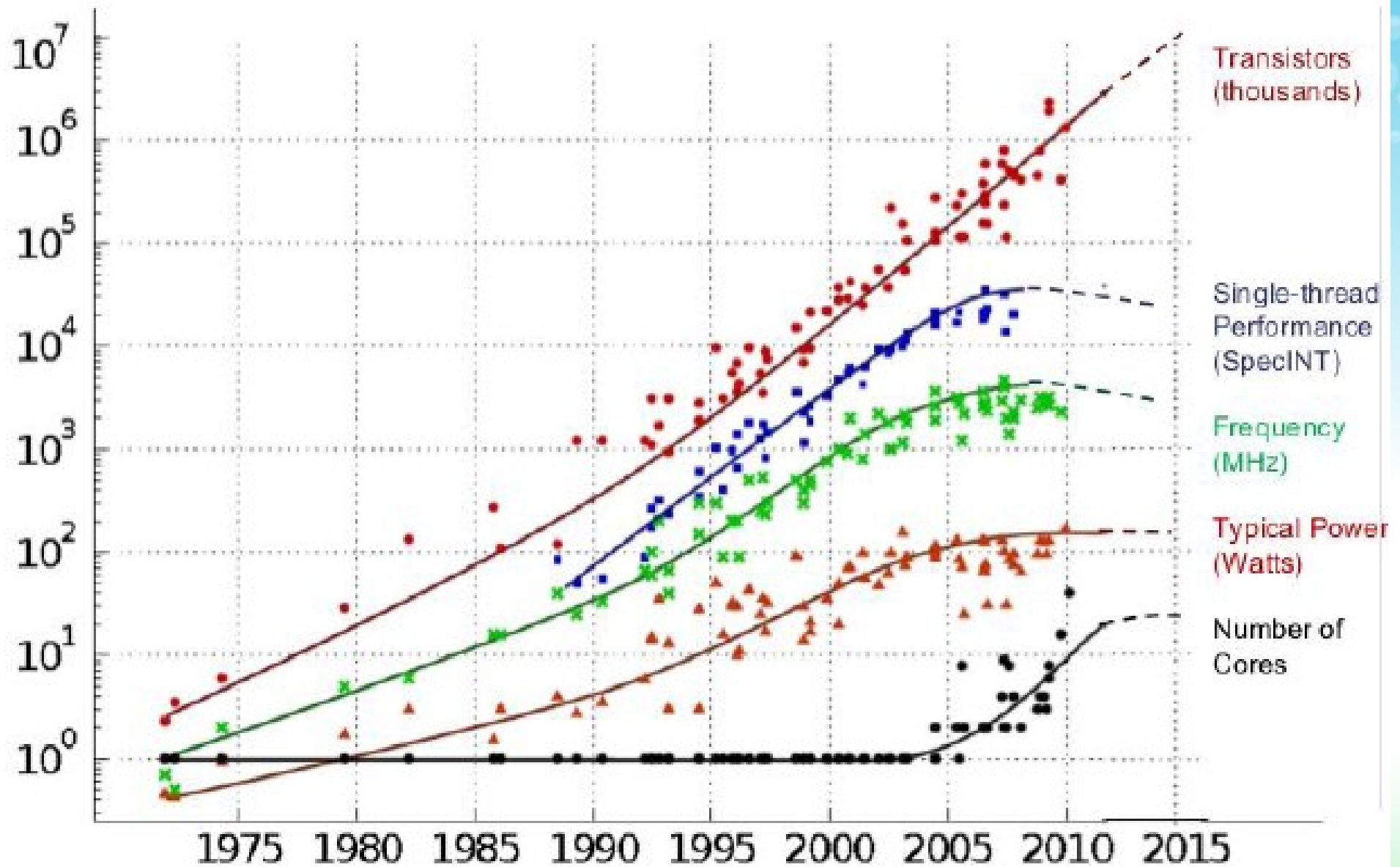# The grows of the data and computing in high energy physics

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Facts about data from LHC beyond 2015

- ~130PB/year is expected in 2020
- The storage is largest computing cost (in ATLAS 60% more than CPUs)
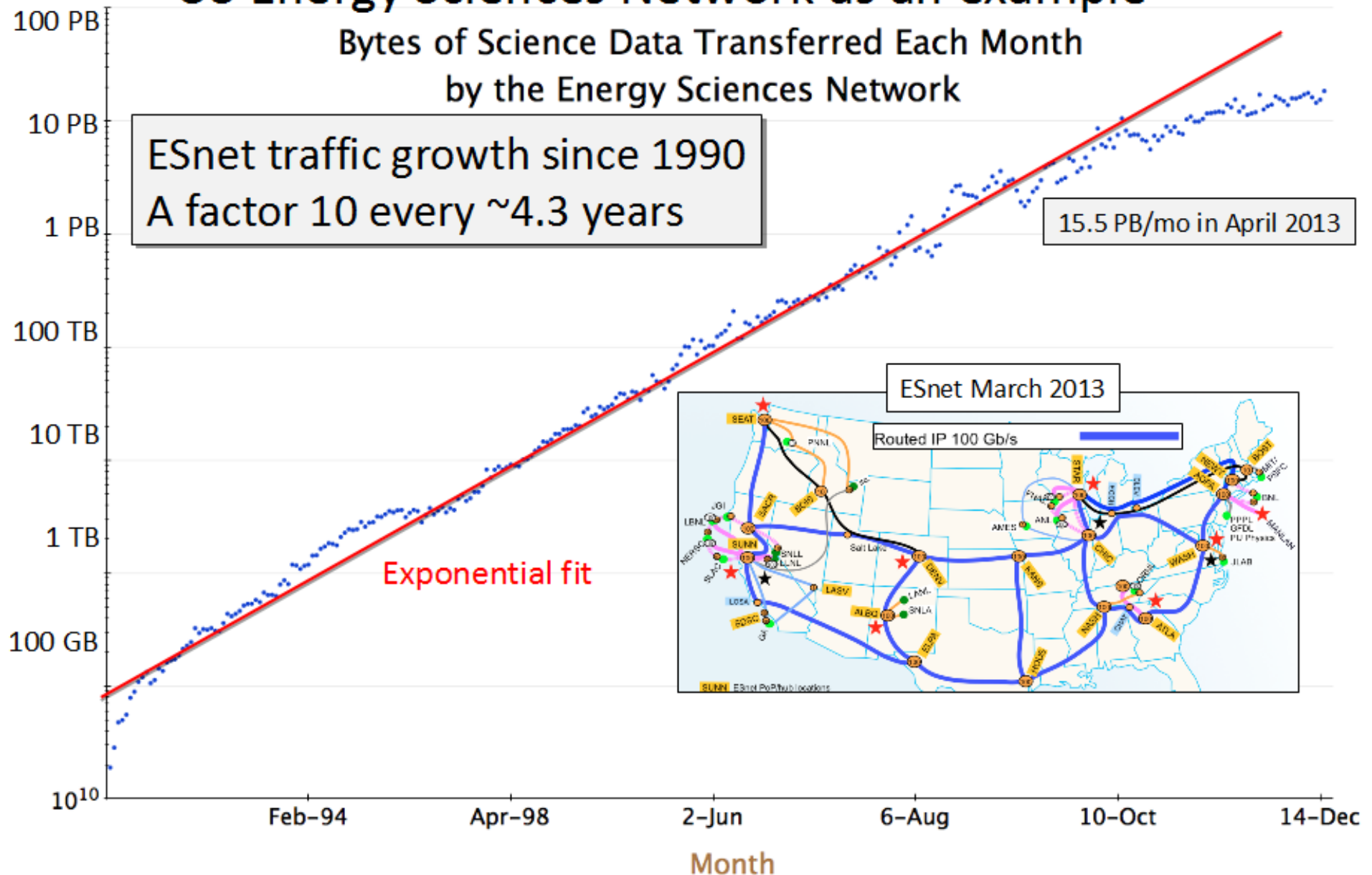- «In general it is much cheaper to transfer data than to store it»

35 YEARS OF MICROPROCESSOR TREND DATA

Transistors (thousands)

Single-thread Performance (SpecINT)

Frequency (MHz)

Typical Power (Watts)

Number of Cores

Original data collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond and C. Batten
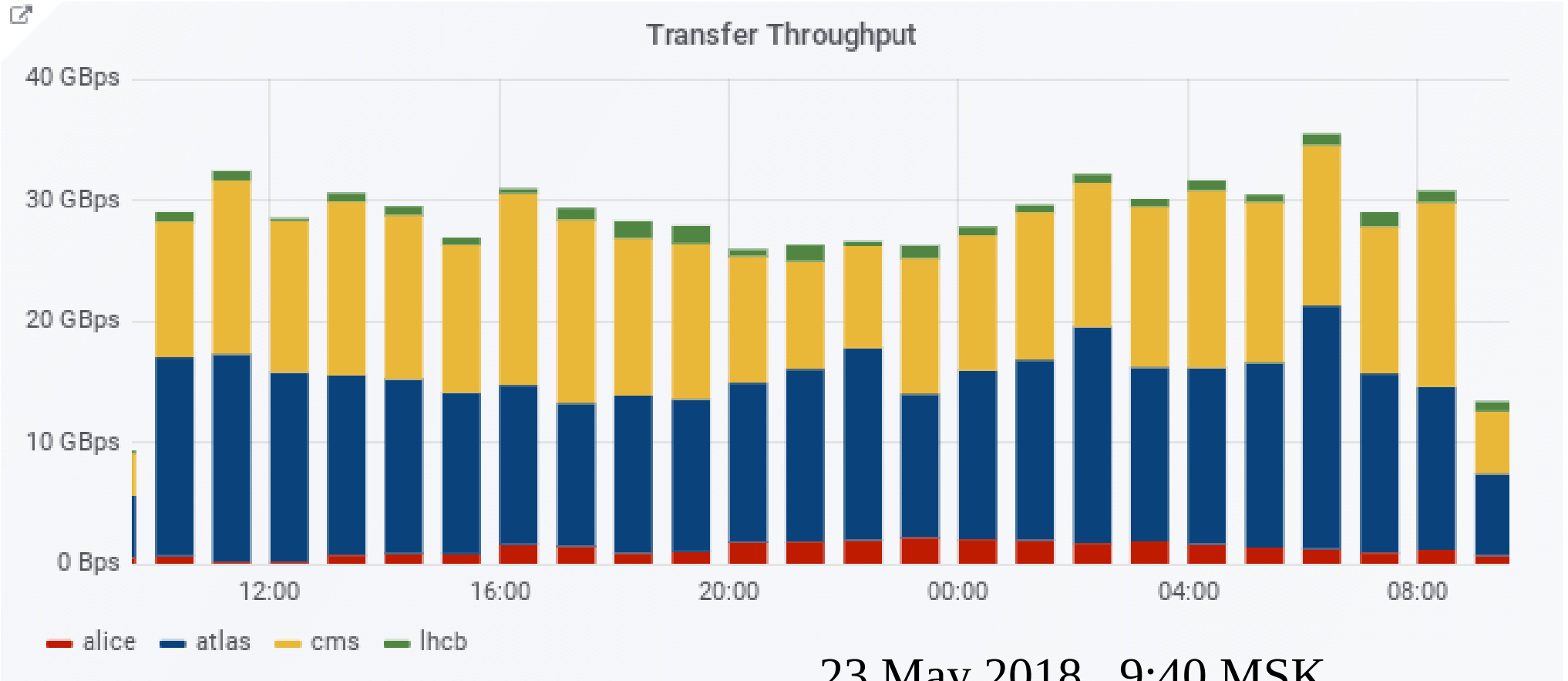Dotted line extrapolations by C. Moore.

Networking growth has been dramatic
US Energy Sciences Network as an example

Bytes of Science Data Transferred Each Month
by the Energy Sciences Network

ESnet traffic growth since 1990
A factor 10 every ~4.3 years

15.5 PB/mo in April 2013

100 PB
10 PB
1 PB
100 TB
10 TB
1 TB
100 GB
10^{10}

Exponential fit

ESnet March 2013

Routed IP 100 Gb/s

Feb-94   Apr-98   2-Jun   6-Aug   10-Oct   14-Dec

Month
Michael Ernst, BNL   CHEP 2015, Okinawa

3

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Welcome to the Worldwide LHC Computing Grid

Last 24 hours

23 May 2018   9:40 MSK

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Technology: Baseline Boundary Conditions in 2025

Technology	Growth in 10 years
CPU Servers	x4 - 14
Disk Capacity	x4 - 10
Tape Capacity	x10 - 30
Network Capacity	x30 - 200

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