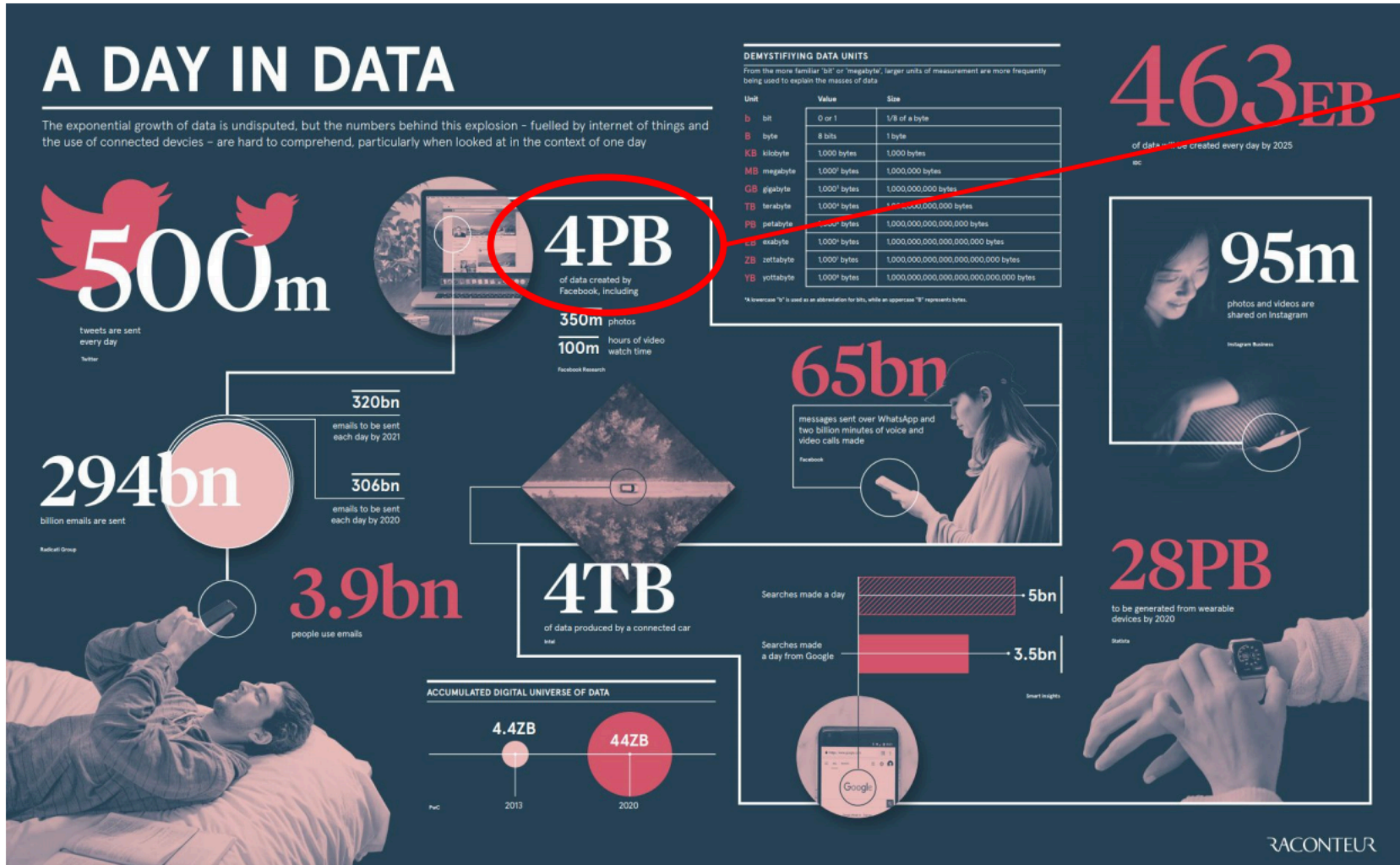
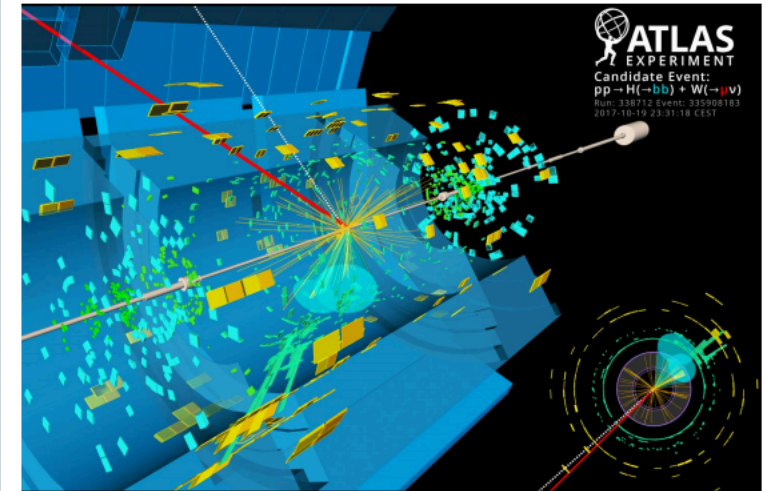


# Challenge in Readout of Particle Physics Experiment



4PB/day for Facebook



ATLAS raw data from detector: ~1Pb/s

FCC-hh: ~1PB/s

→ With zero suppression

Image: Raconteur  
Kai Chen (BNL)

# EXASCALE RAW DATA RATES



- HL LHC
  - $\sim 5E9$  channels @ 40 MHz streaming data, unsuppressed (that needs reducing)
- FCChh
  - $\sim 5-10X$  HL LHC?
  - $\rightarrow 10^{18}$  bytes/sec streaming from detectors



# PRIORITY RESEARCH AREAS



- Streaming DAQ
- Fast Machine Learning
- Challenges for reading out a pixel detector at a reasonable rate for trigger
- Development of tools that leverage new technology
- Automated, self-running DAQ systems
- Precision timing in trigger, and precision synchronization
- 4D tracking with spatial and timing readout
- Rad-hard high bandwidth data links, high bandwidth wireless transmission