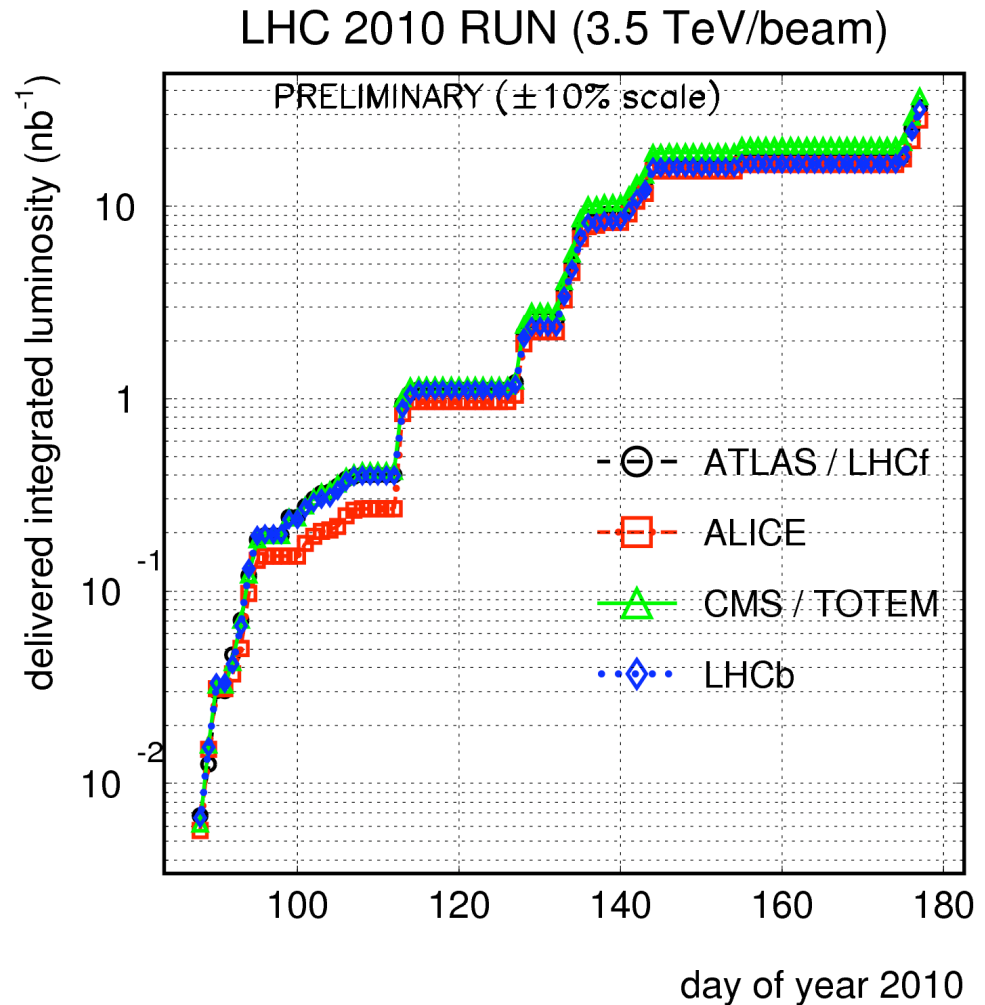


# Utilization

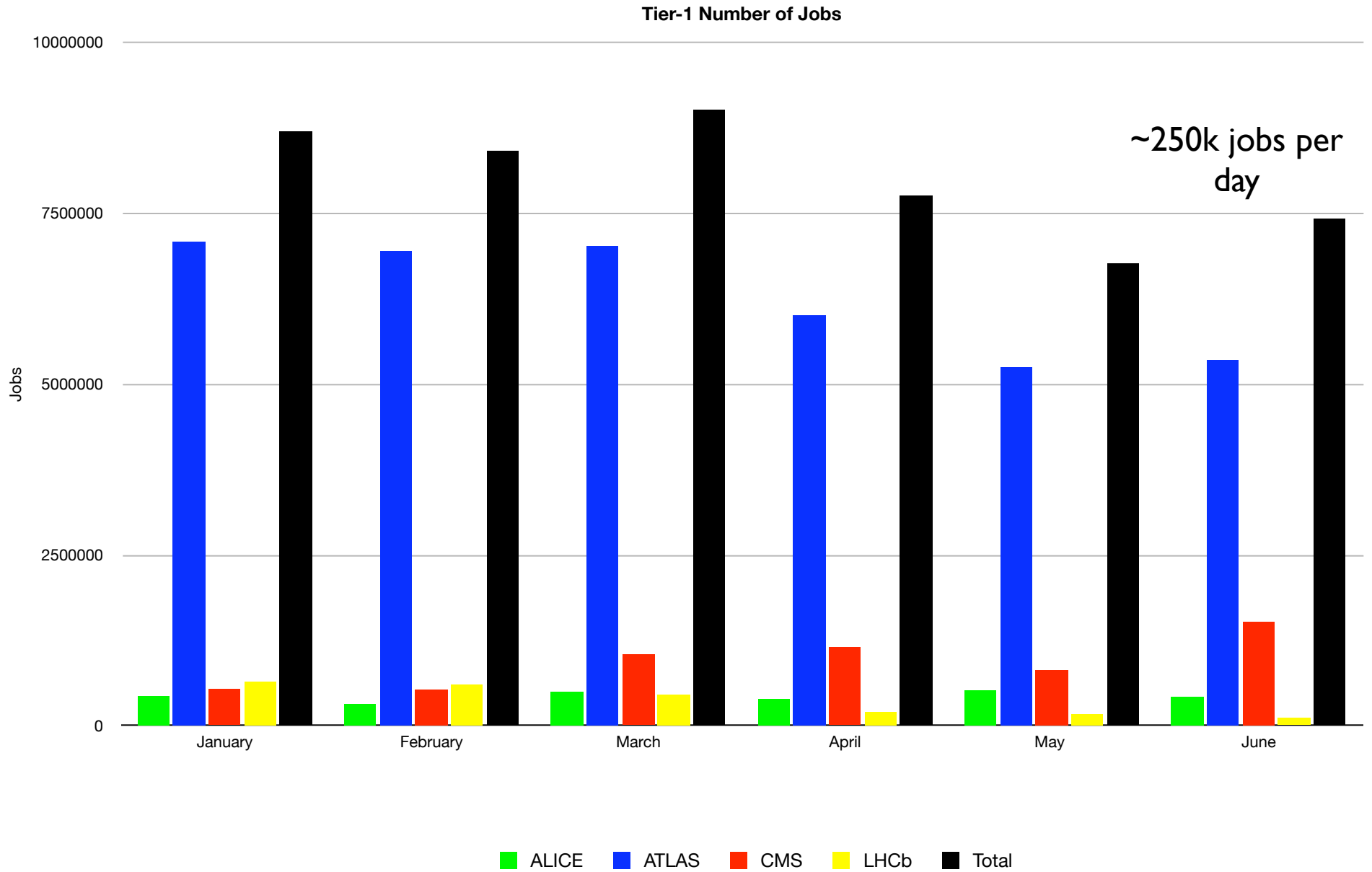
07 July 2010  
Ian Fisk

# Utilization

- ▶ What Follows is mostly taken from the Accounting Portal
- ▶ There are probably better ways to define utilization, but we're setup to measure CPU efficiency
- ▶ Total Integrated Luminosity is lower than expected
- ▶ Though Data Volume scales with number of days of data collection

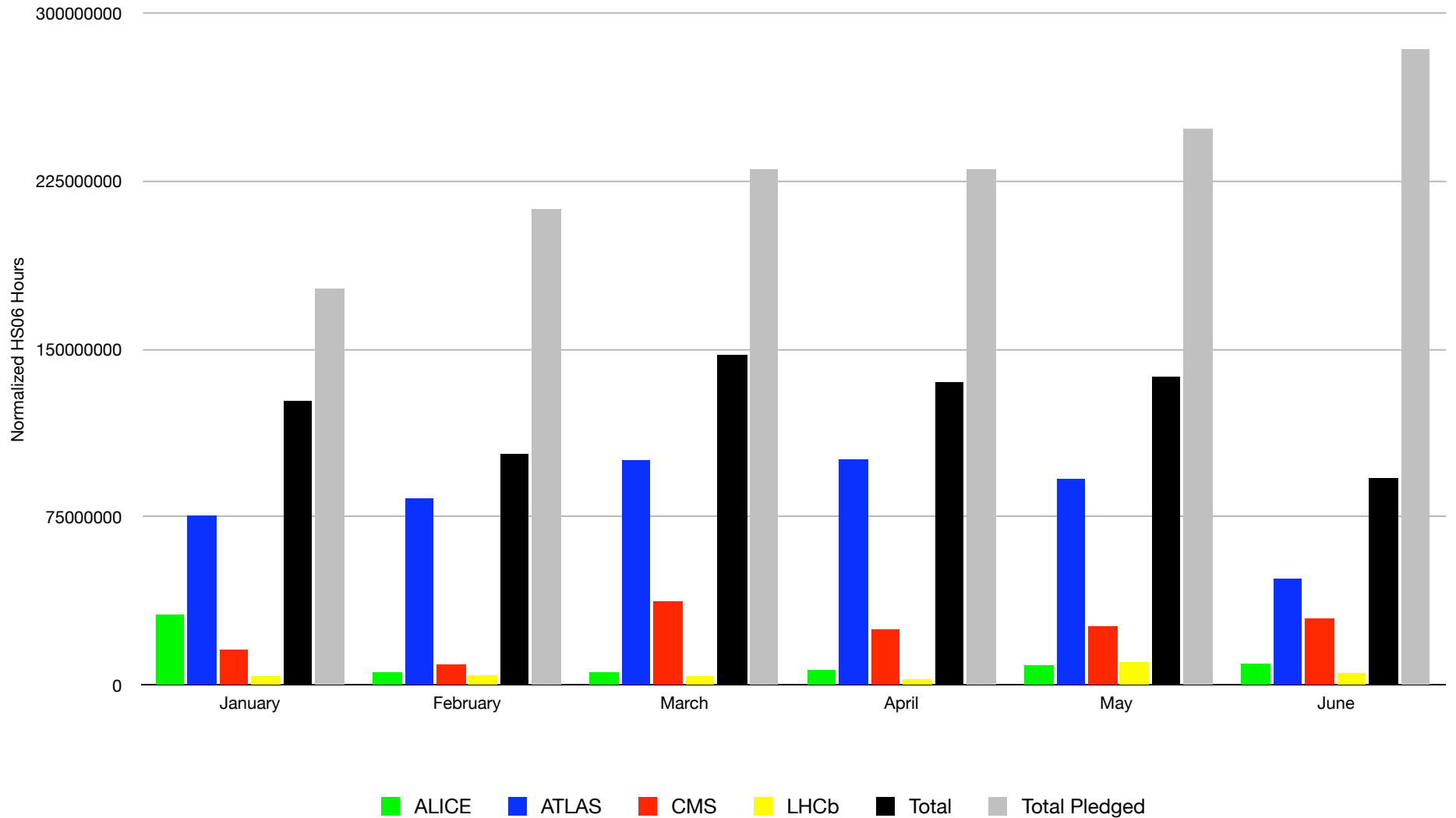


# Tier-1 Number of Jobs



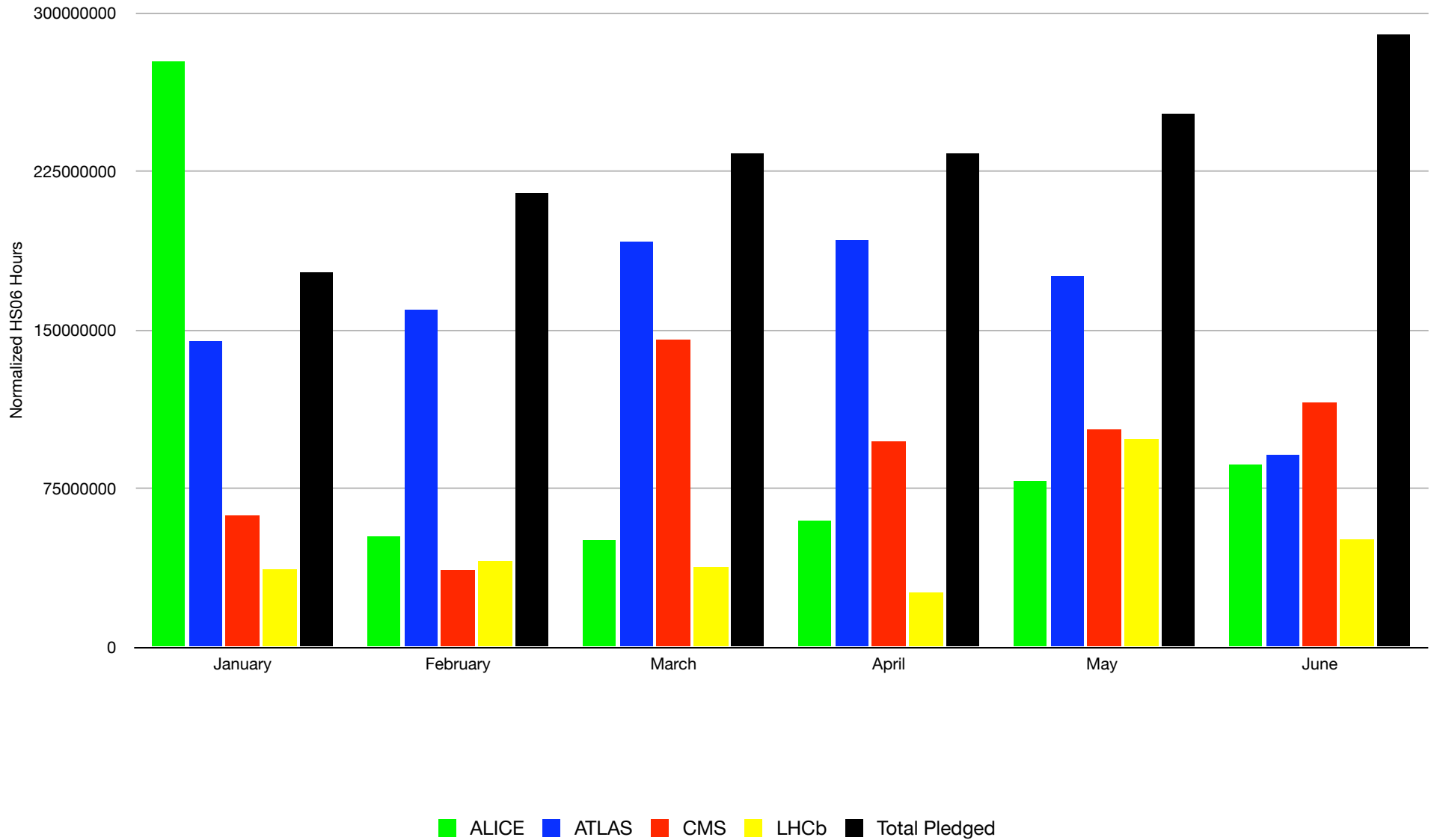
# Tier-I Normalized CPU

Elapse Time Tier-1

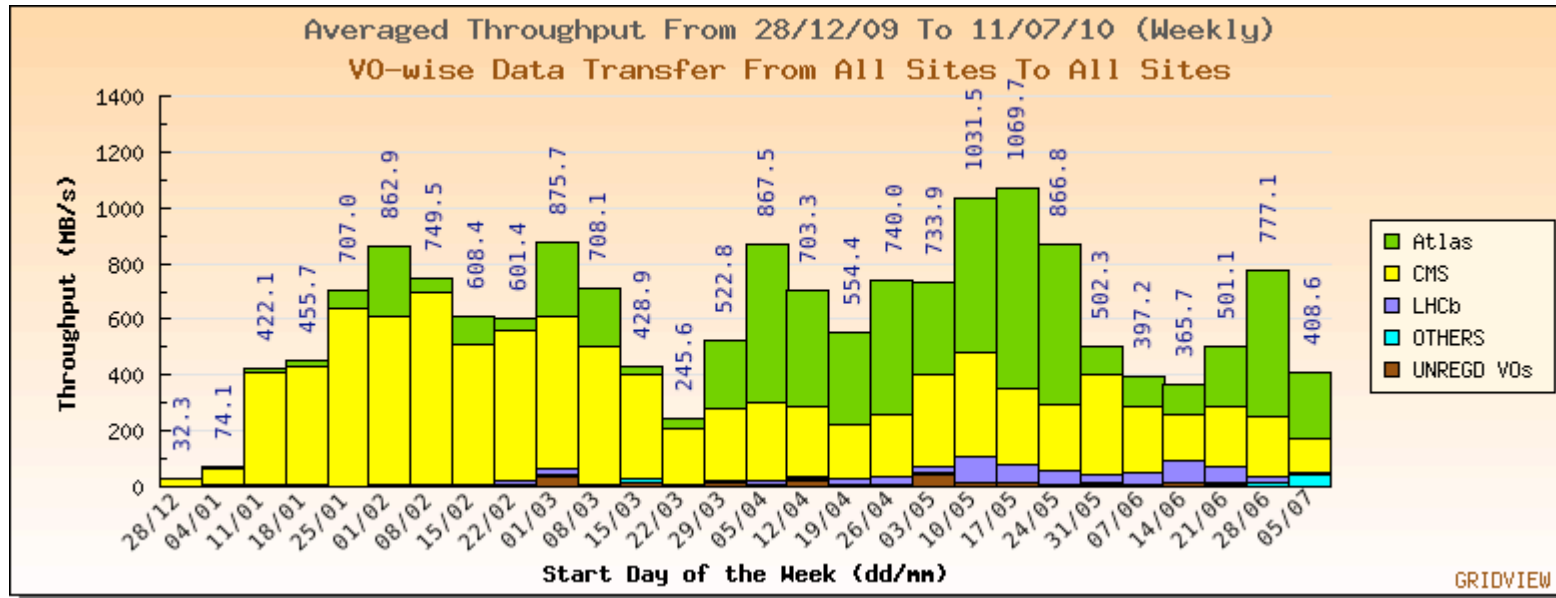


# Tier-1s Normalized by Share

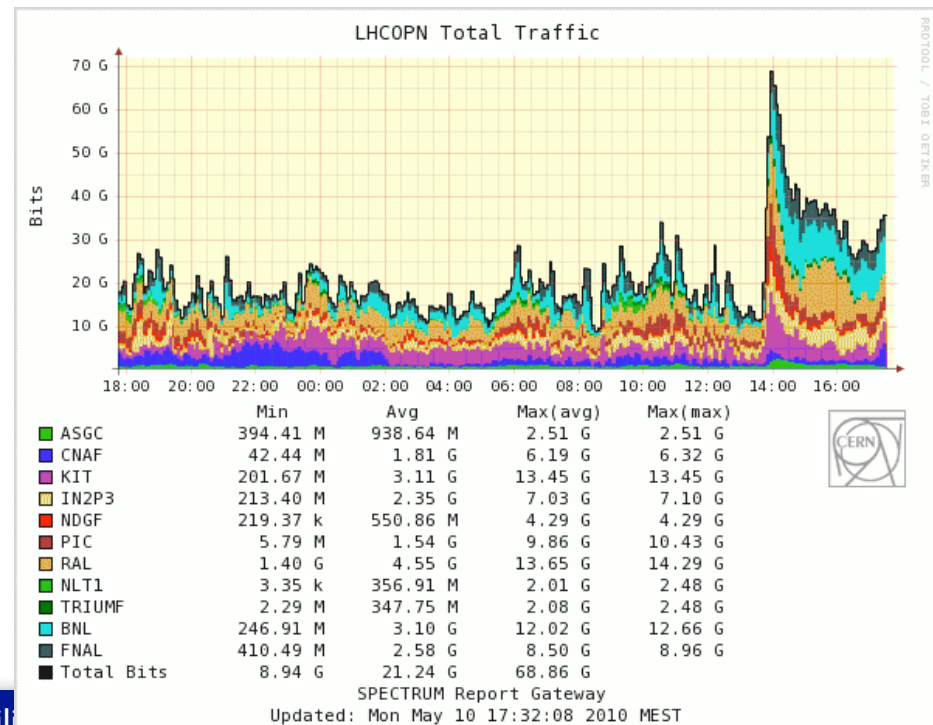
Normalized By Offered Fraction of Tier-1 Resources



# Transfers Tier-1 to Tier-2



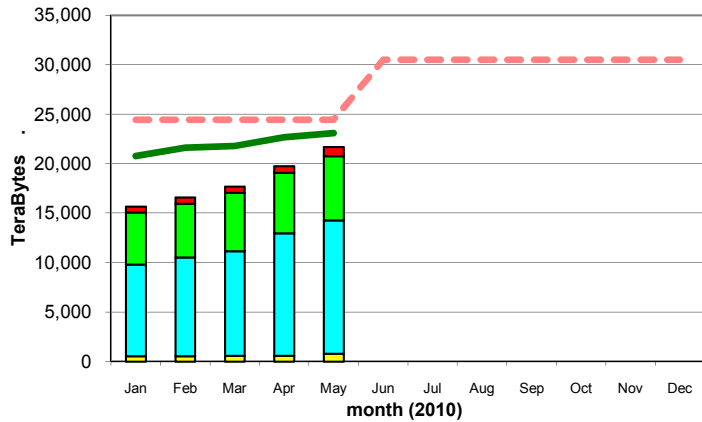
- ▶ Average Data Rate by week out of CERN is within a factor of 2 of planning
- ▶ Rate Between Tier-1s bursts to very large values



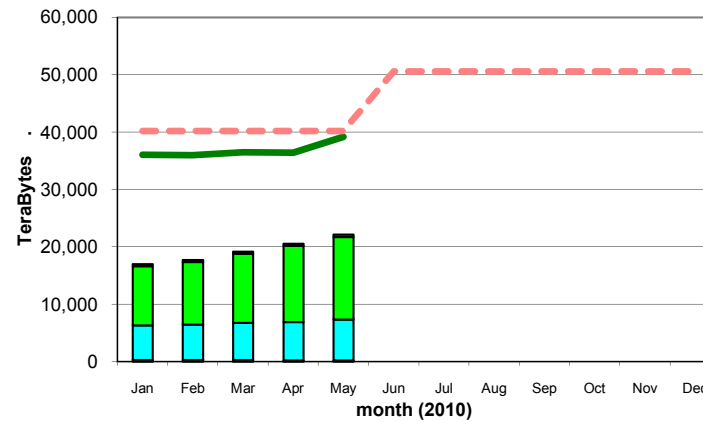
# Tier-1 Disk Space

▶ Experiments are using the installed disk

Disk Storage Used

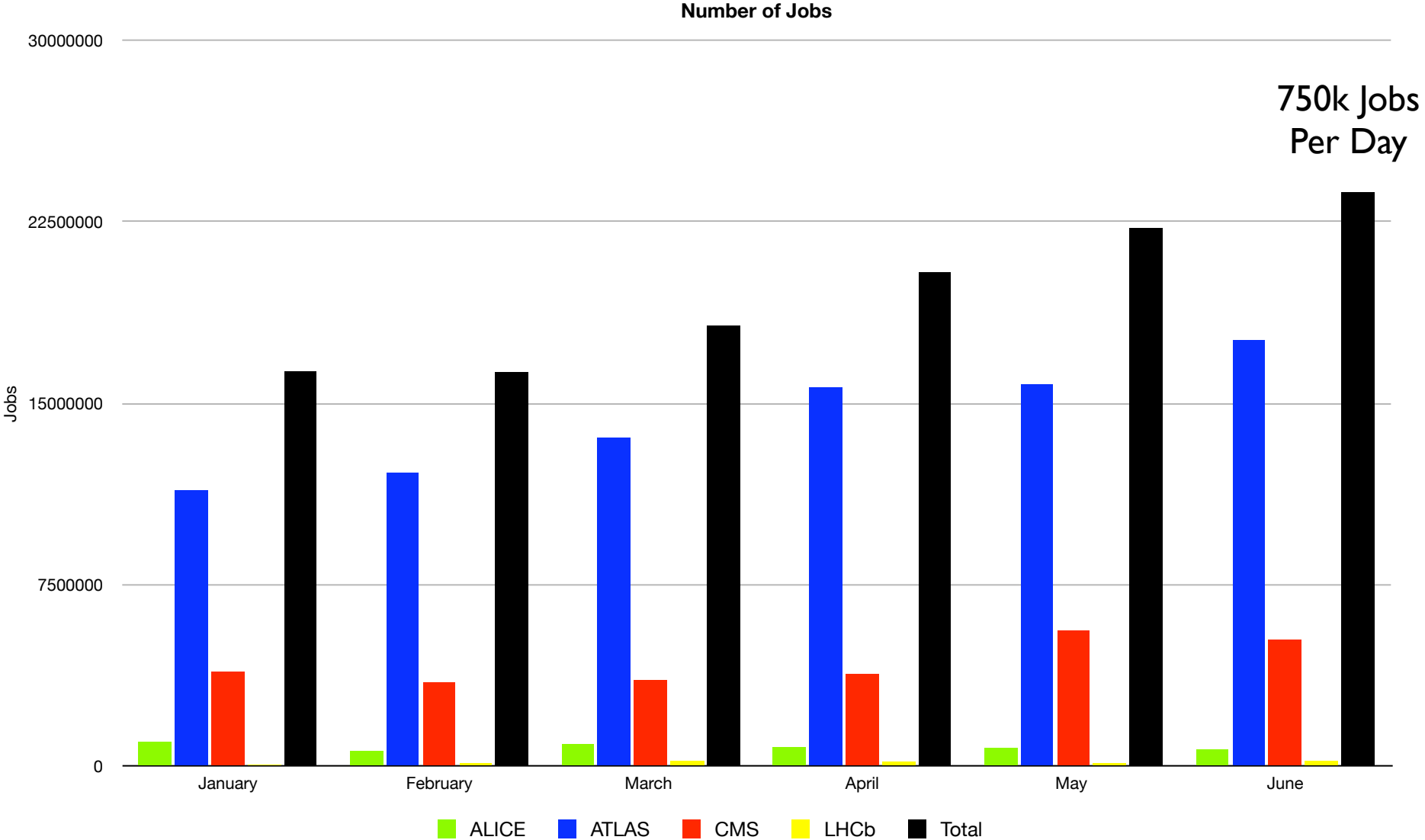


Tape Storage Used



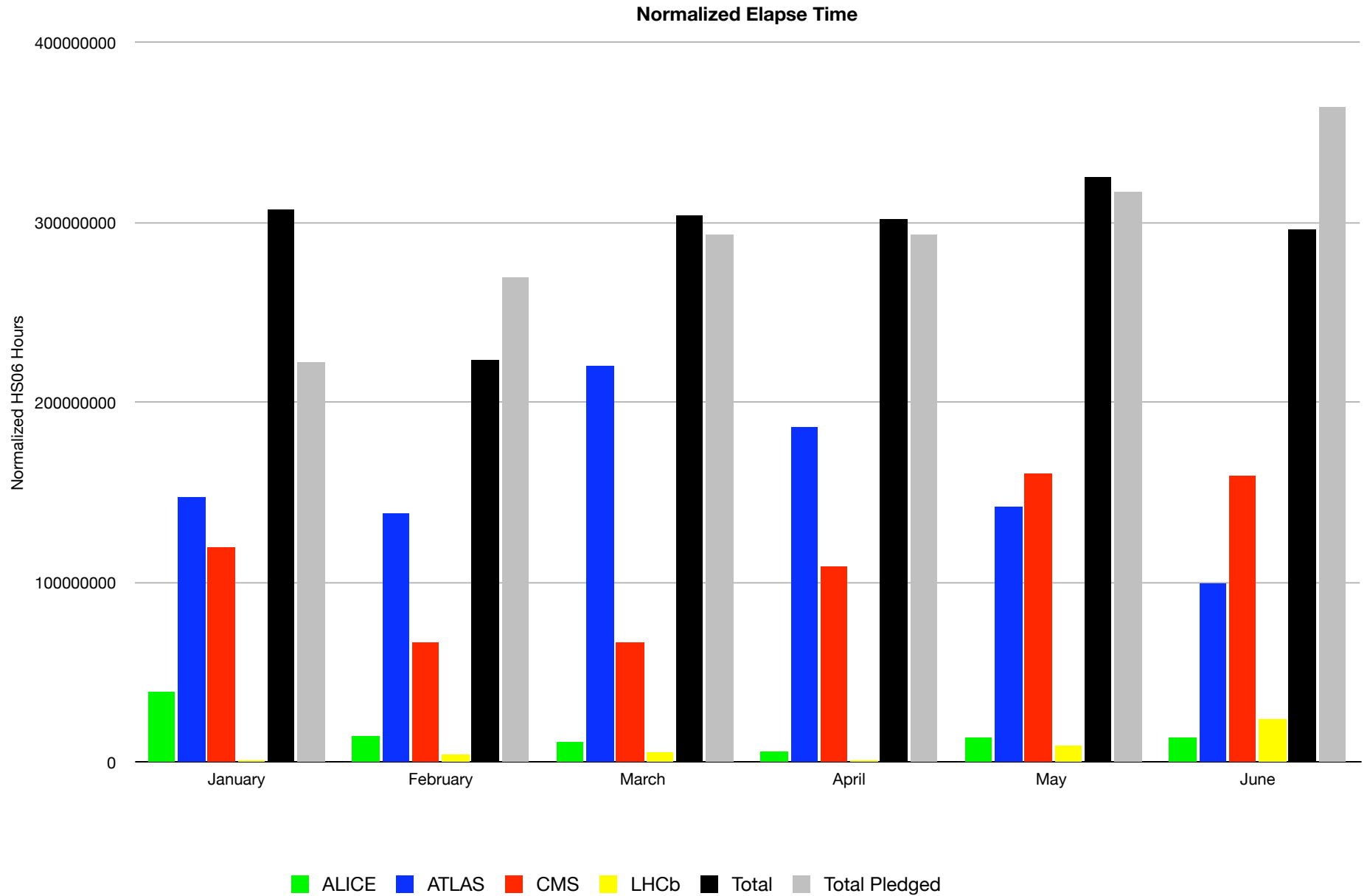
ALICE ■ CMS ■ installed capacity (inc. efficiency factor) — installed capacity (w/o efficiency factor) —  
 ATLAS ■ LHCb ■ MoU commitment (inc. efficiency factor) - - - site average - cpu:wall\_clock ratio —

# Tier-2 Summary

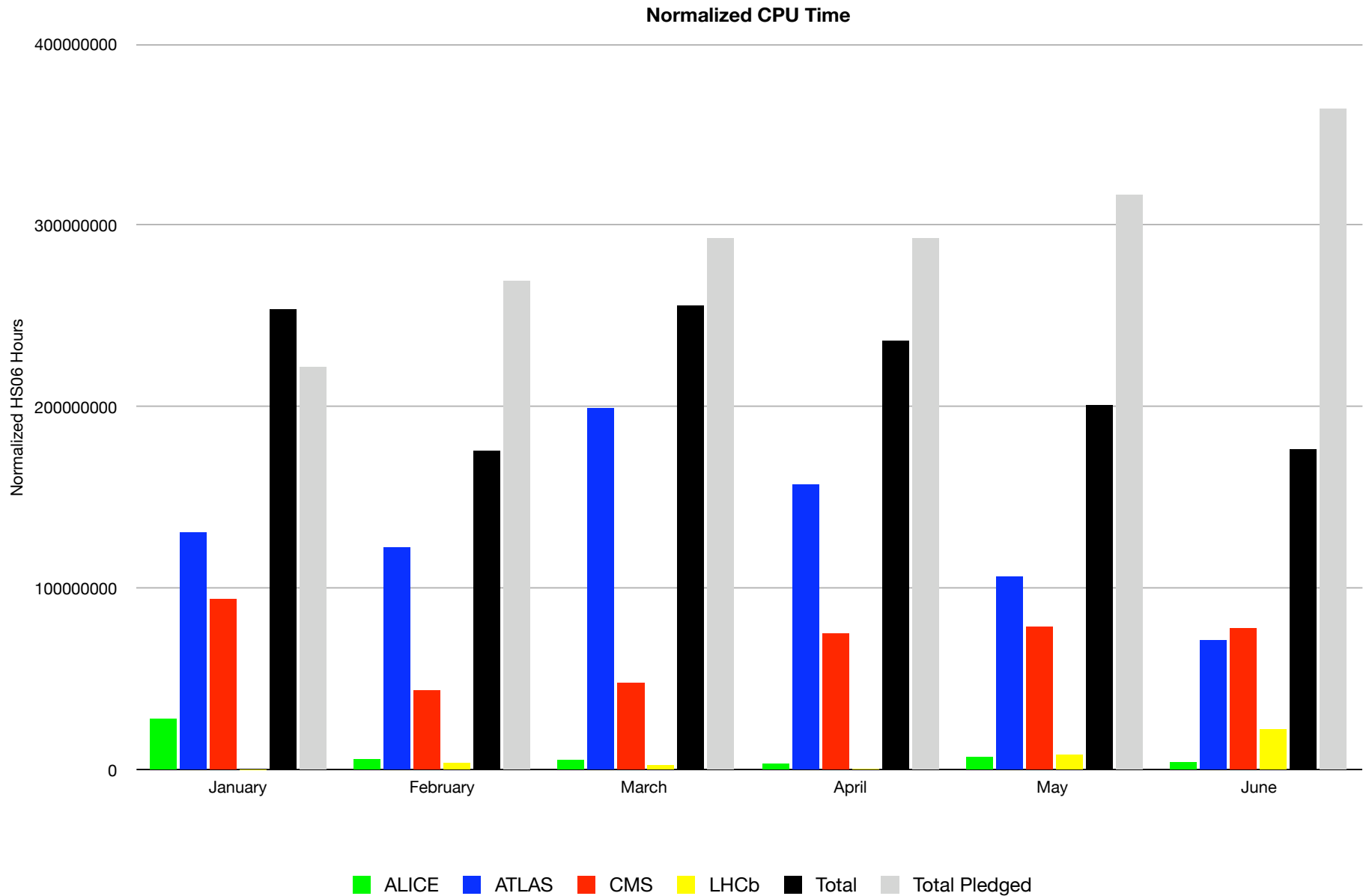




# Tier-2 Elapse Time

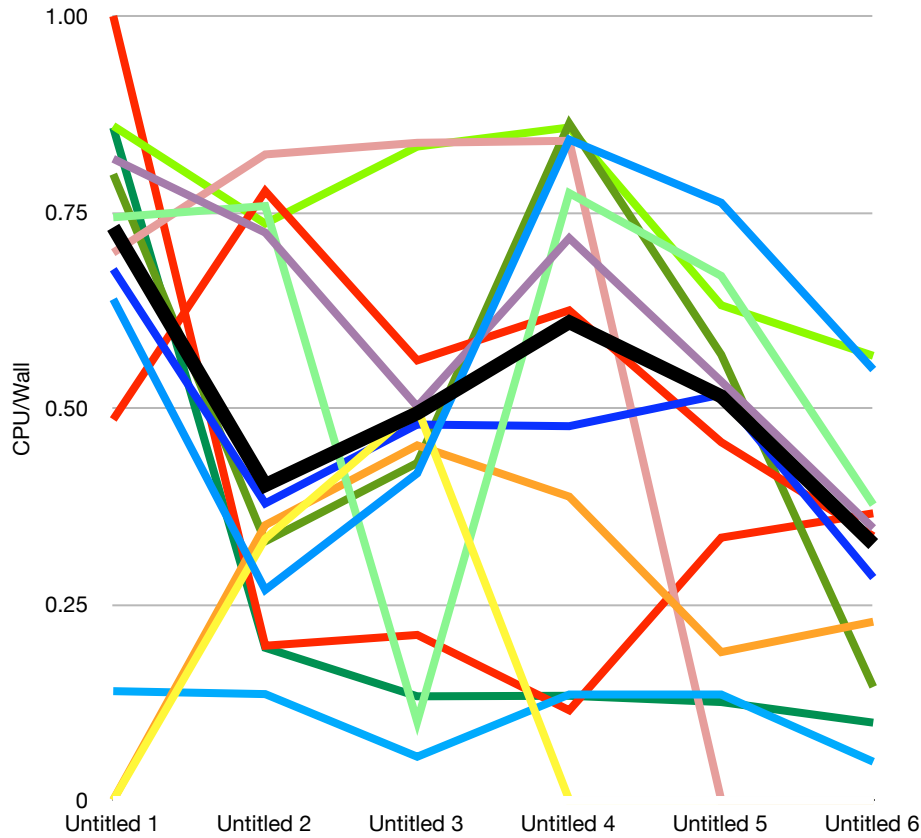


# Tier-2 CPU Time

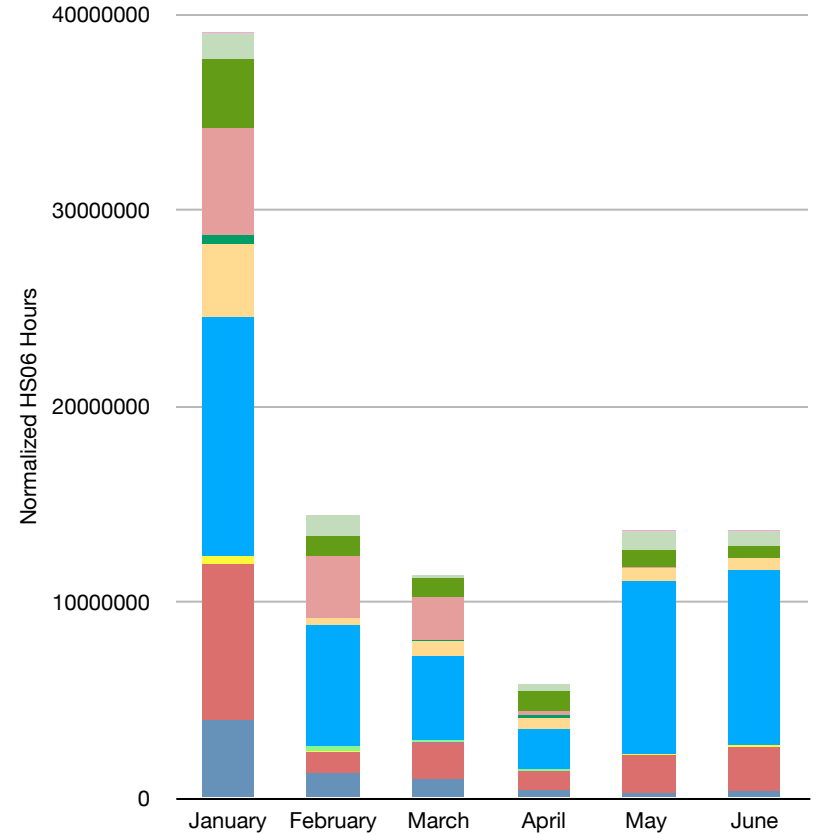


# ALICE

ALICE CPU Efficiency



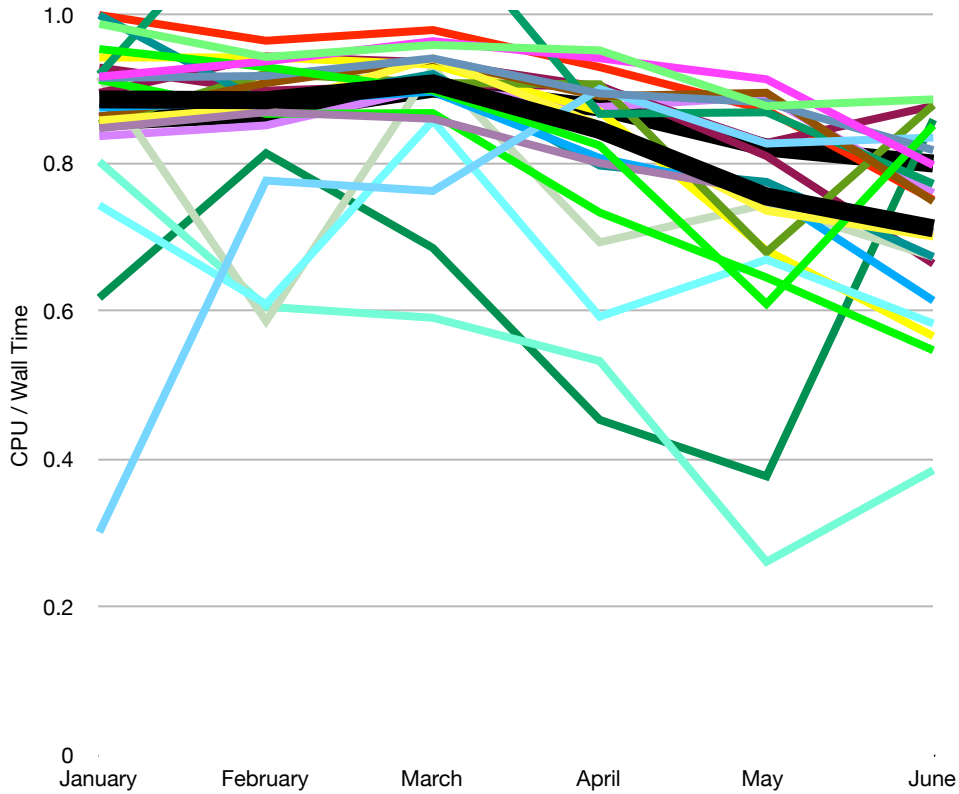
ALICE Normalized Elapse Time



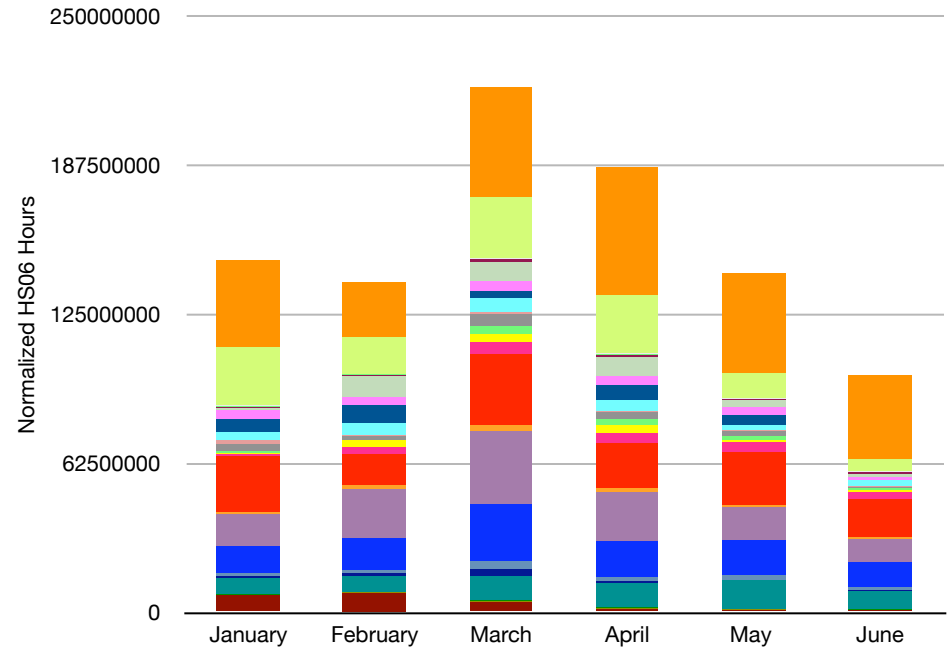
- |                     |            |              |                   |         |                   |
|---------------------|------------|--------------|-------------------|---------|-------------------|
| — Total             | Australia  | Austria      | Australia         | Austria | Belgium           |
| — Belgium           | Brazil     | Canada       | Brazil            | Canada  | China             |
| — China             | Czech Rep. | Estonia      | China             | Estonia | Finland           |
| — Finland           | France     | Germany      | Finland           | Germany | Hungary           |
| — Hungary           | India      | Israel       | Hungary           | India   | Italy             |
| — Italy             | Japan      | Norway       | Italy             | Israel  | Pakistan          |
| — Pakistan          | Poland     | Portugal     | Pakistan          | Japan   | Republic of Korea |
| — Republic of Korea | Romania    | Russian Fed. | Republic of Korea | Poland  | Slovenia          |
| — Slovenia          | Spain      | Sweden       | Slovenia          | Romania | Switzerland       |
| — Switzerland       | Taipei     | Turkey       | Switzerland       | Spain   | UK                |
| — UK                | USA        |              | UK                | Taipei  |                   |
|                     |            |              |                   | USA     |                   |

# ATLAS

### ATLAS CPU Efficiency



### ATLAS Normalized Elapse Time

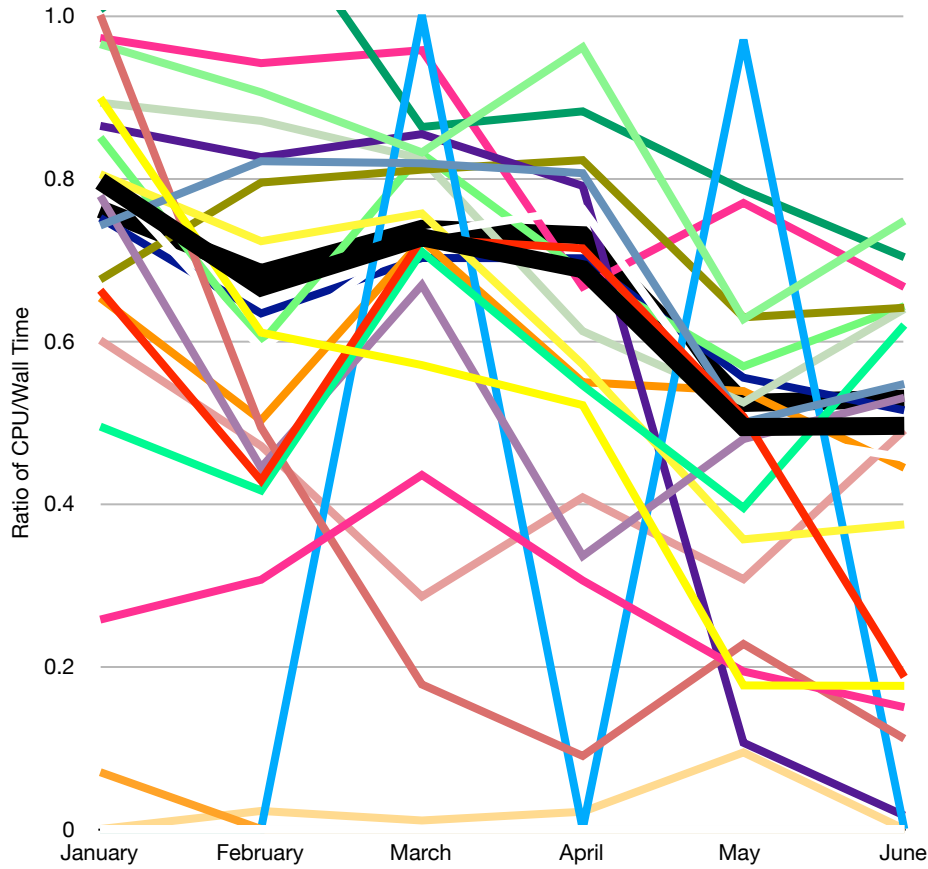


- |                     |              |                |
|---------------------|--------------|----------------|
| — Total             | — Australia  | — Austria      |
| — Belgium           | — Brazil     | — Canada       |
| — China             | — Czech Rep. | — Estonia      |
| — Finland           | — France     | — Germany      |
| — Hungary           | — India      | — Israel       |
| — Italy             | — Japan      | — Norway       |
| — Pakistan          | — Poland     | — Portugal     |
| — Republic of Korea | — Romania    | — Russian Fed. |
| — Slovenia          | — Spain      | — Sweden       |
| — Switzerland       | — Taipei     | — Turkey       |
| — UK                | — USA        |                |

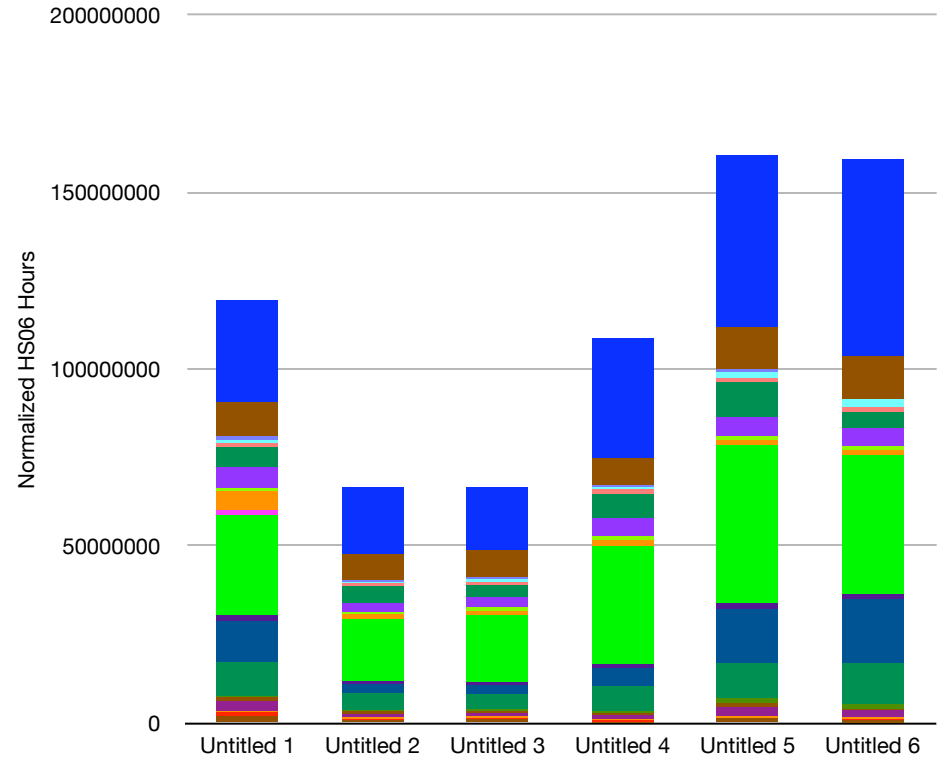
- |              |                |                     |
|--------------|----------------|---------------------|
| — Australia  | — Austria      | — Belgium           |
| — Brazil     | — Canada       | — China             |
| — Czech Rep. | — Estonia      | — Finland           |
| — France     | — Germany      | — Hungary           |
| — India      | — Israel       | — Italy             |
| — Japan      | — Norway       | — Pakistan          |
| — Poland     | — Portugal     | — Republic of Korea |
| — Romania    | — Russian Fed. | — Slovenia          |
| — Spain      | — Sweden       | — Switzerland       |
| — Taipei     | — Turkey       | — UK                |
| — USA        |                |                     |

# CMS

## CMS CPU Efficiency



## CMS Normalized Elapse Time

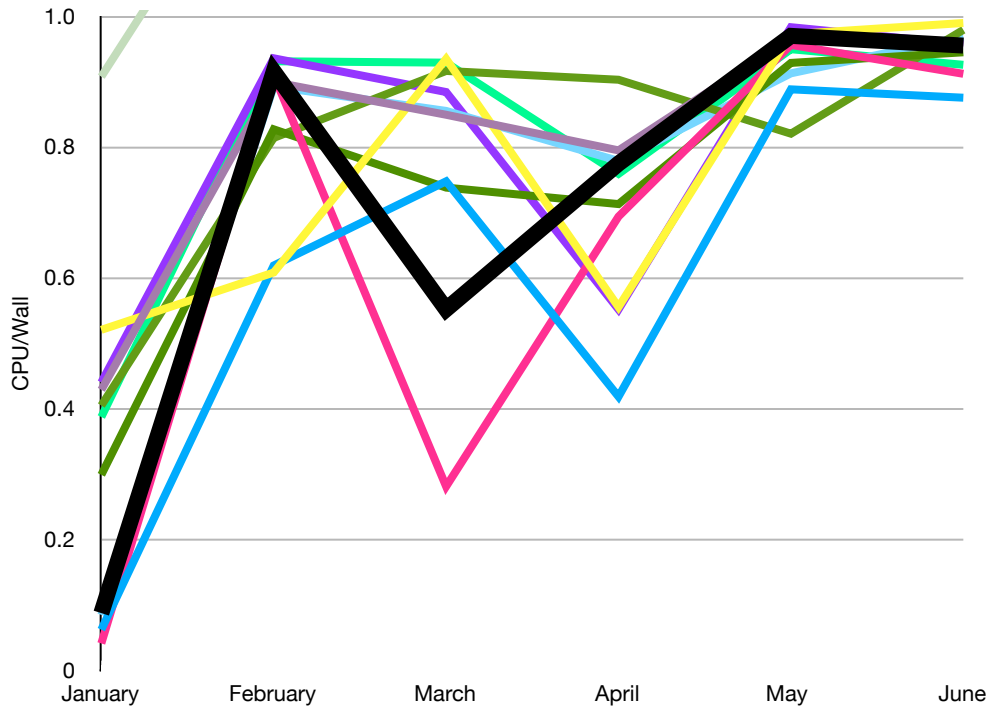


- |                     |              |                |
|---------------------|--------------|----------------|
| — Total             | Australia    | — Austria      |
| — Belgium           | — Brazil     | — Canada       |
| — China             | — Czech Rep. | — Estonia      |
| — Finland           | — France     | — Germany      |
| — Hungary           | — India      | — Israel       |
| — Italy             | — Japan      | — Norway       |
| — Pakistan          | — Poland     | — Portugal     |
| — Republic of Korea | — Romania    | — Russian Fed. |
| — Slovenia          | — Spain      | — Sweden       |
| — Switzerland       | — Taipei     | — Turkey       |
| — UK                | — USA        |                |

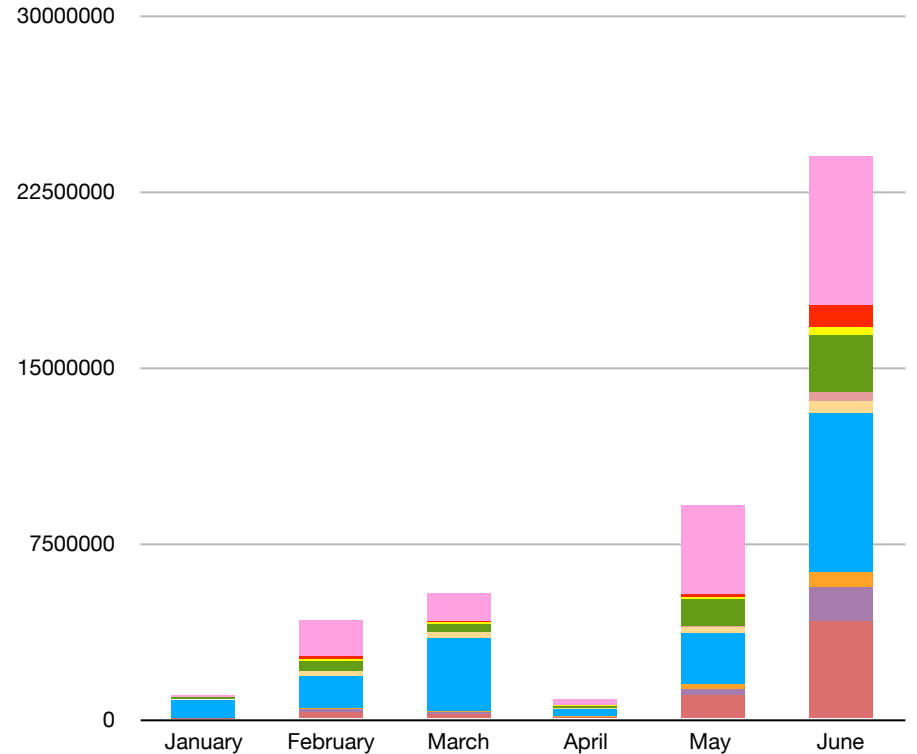
- |              |                |                     |
|--------------|----------------|---------------------|
| Australia    | — Austria      | — Belgium           |
| — Brazil     | — Canada       | — China             |
| — Czech Rep. | — Estonia      | — Finland           |
| — France     | — Germany      | — Hungary           |
| — India      | — Israel       | — Italy             |
| — Japan      | — Norway       | — Pakistan          |
| — Poland     | — Portugal     | — Republic of Korea |
| — Romania    | — Russian Fed. | — Slovenia          |
| — Spain      | — Sweden       | — Switzerland       |
| — Taipei     | — Turkey       | — UK                |
| — USA        |                |                     |

# LHCb

### LHCb CPU Efficiency



### LHCb Normalized Elapse Time



- |                     |            |              |            |              |                   |
|---------------------|------------|--------------|------------|--------------|-------------------|
| — Total             | Australia  | Austria      | Australia  | Austria      | Belgium           |
| — Belgium           | Brazil     | Canada       | Brazil     | Canada       | China             |
| — China             | Czech Rep. | Estonia      | Czech Rep. | Estonia      | Finland           |
| — Finland           | France     | Germany      | France     | Germany      | Hungary           |
| — Hungary           | India      | Israel       | India      | Israel       | Italy             |
| — Italy             | Japan      | Norway       | Japan      | Norway       | Pakistan          |
| — Pakistan          | Poland     | Portugal     | Poland     | Portugal     | Republic of Korea |
| — Republic of Korea | Romania    | Russian Fed. | Romania    | Russian Fed. | Slovenia          |
| — Slovenia          | Spain      | Sweden       | Spain      | Sweden       | Switzerland       |
| — Switzerland       | Taipei     | Turkey       | Taipei     | Turkey       | UK                |
| — UK                | USA        |              | USA        |              |                   |

# Outlook

- ▶ Tier-1 Utilization is not 100%
  - ▶ Driven by complexity of data.
  - ▶ Will ramp up over the fall
  
- ▶ Tier-2 Utilization is high
  - ▶ Driven by user access and simulation