GEM Readout: APV25 quantity

MPD/GEM readout chain:

- **128 analog ch / APV25 ASIC**
- **3.4 µs trigger latency** (analog pipeline)
- Capable of sampling signal at 40 MHz
- Multiplexed analog output (100 kHz readout rate)

### GEn-RP GEM Equipment: MPD Readout & DAQ

<table>
<thead>
<tr>
<th>Channels</th>
<th>APV25</th>
<th>MPDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVA GEMs</td>
<td>113000</td>
<td>880</td>
</tr>
<tr>
<td>INFN GEMs</td>
<td>14000</td>
<td>108</td>
</tr>
</tbody>
</table>

988 APV25 chips

**From:** Kondo Gnannvo
Data Rates & Backend Recommendations

- 988 APV25 * 128 = 126464 strips
- SSP/VTP records 6 APV samples for each strip considered hit in event (2 hits per 32bit word => 12 bytes per hit)
- Occupancy defined as average % of strips with hit in an event
- GEM data rate = trigger_rate * 988APV * 128ch/APV * 12 bytes/hit * occupancy
  - 2 kHz trigger: 10% occupancy = 0.3 GB/s  
    20% occupancy = 0.6 GB/s  
    30% occupancy = 0.9 GB/s
  - 4 kHz trigger: 10% occupancy = 0.6 GB/s  
    20% occupancy = 1.2 GB/s  
    30% occupancy = 1.8 GB/s

Server & Network:
For >~1 GB/s event builder:
- >=128 GB system RAM
- >=32 physical cores
- dual hardware RAID controller/arrays + backup server
  (Contact Dave Abbott for further details - please confirm with him machine specs before ordering anything)

If event builder is operating over 0.5 GB/s:
- 40 Gbps Ethernet strongly recommended/required (keeping in mind: other systems are reporting data to event builder besides GEM, and network may be used to transfer data to permanent storage).

Network switch ports:
- multiple 40G (for servers) and 10G (for VTP, computing center, and any high data VME controllers)

From: Ben Raydo, Dave Abbott