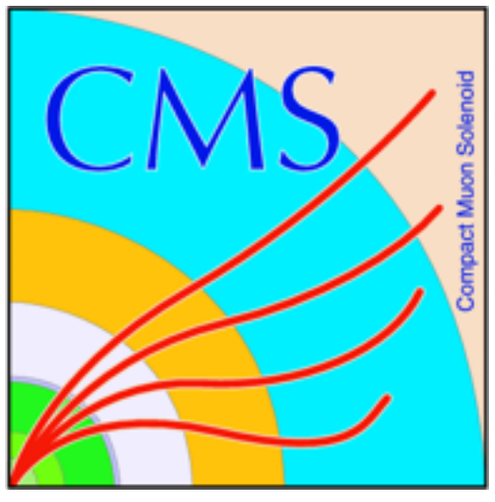
All Experimenters' Meeting: LHC & CMS update

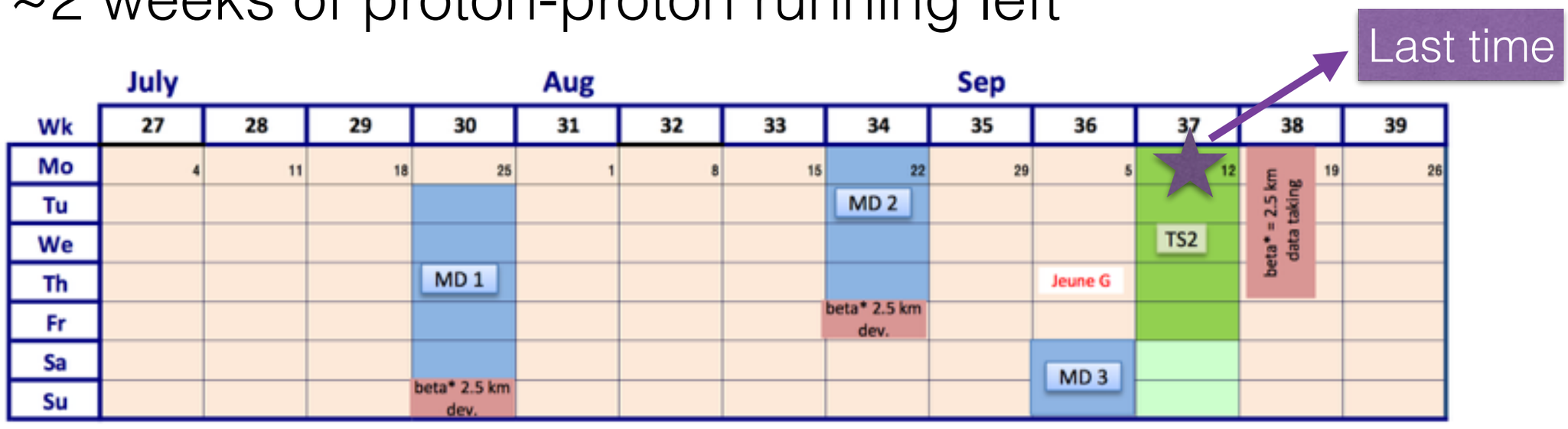
Nadja Strobbe (FNAL)

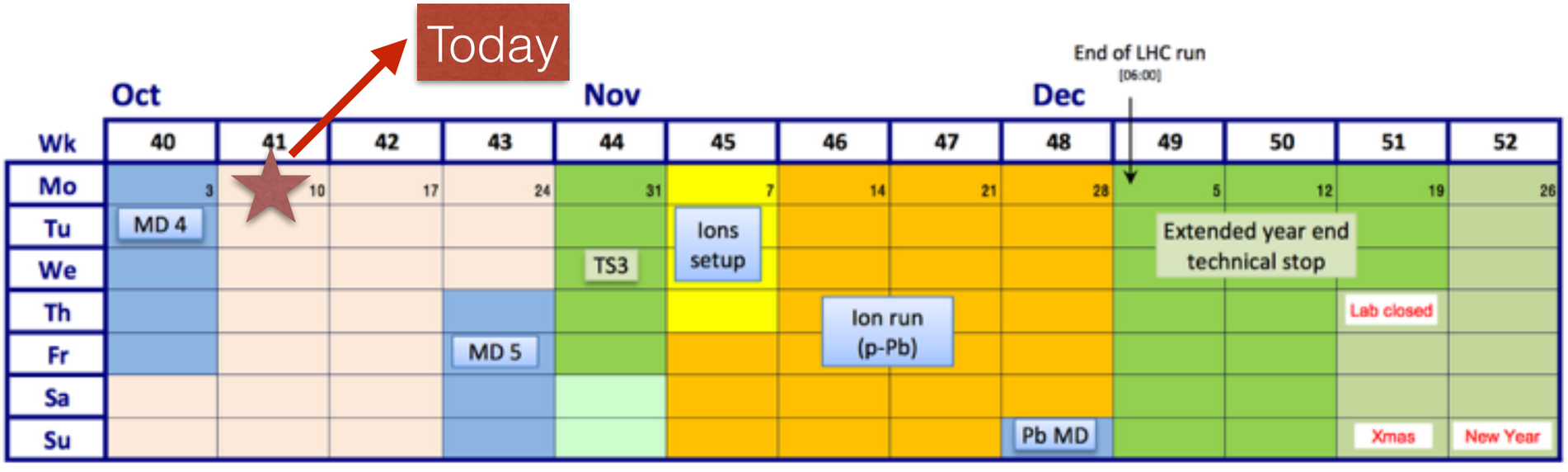
October 10, 2016



Reminder

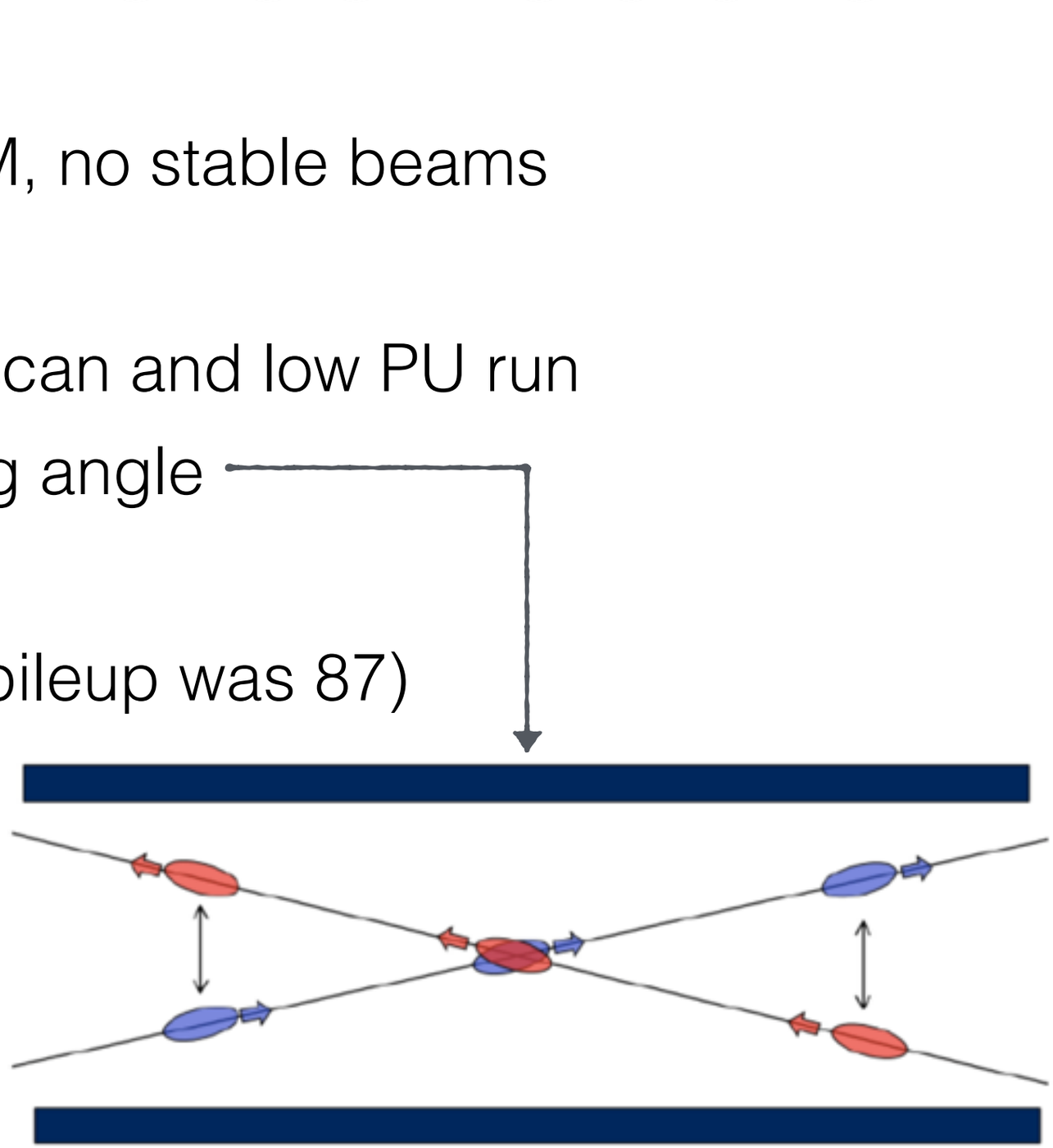
- Last report on September 12 by Zhen Hu (FNAL)
  - LHC delivered 30.9 fb^{-1}, CMS recorded 28.5 fb^{-1}
- ~2 weeks of proton-proton running left





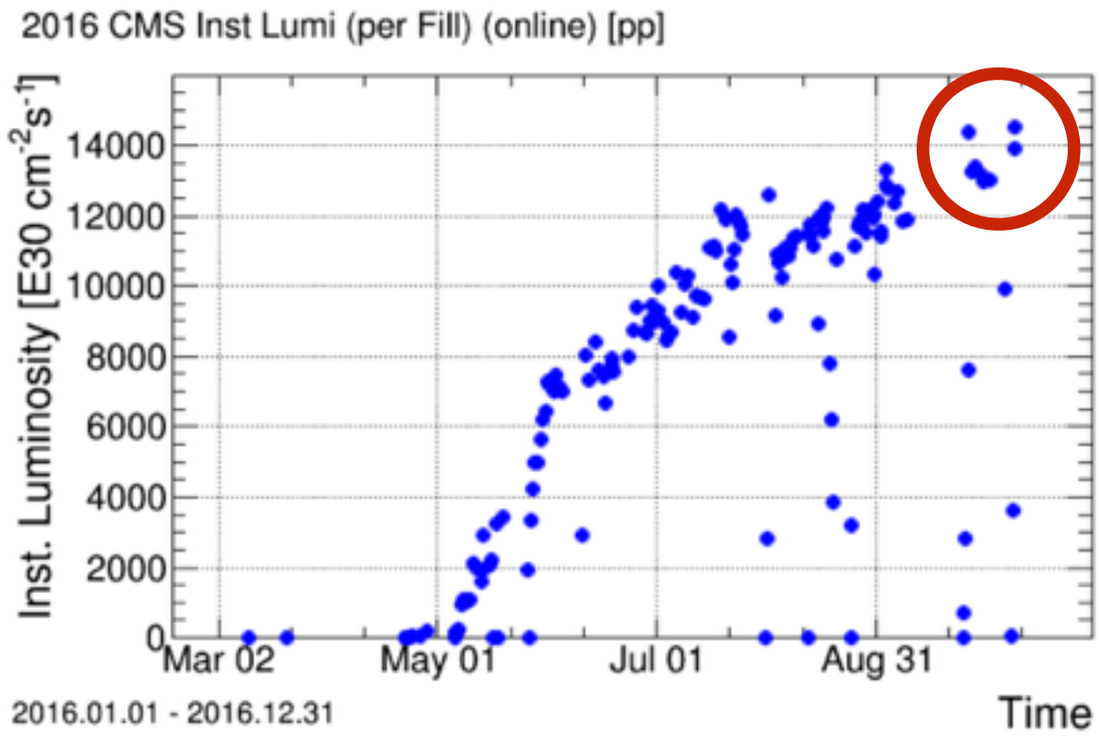
LHC machine schedule

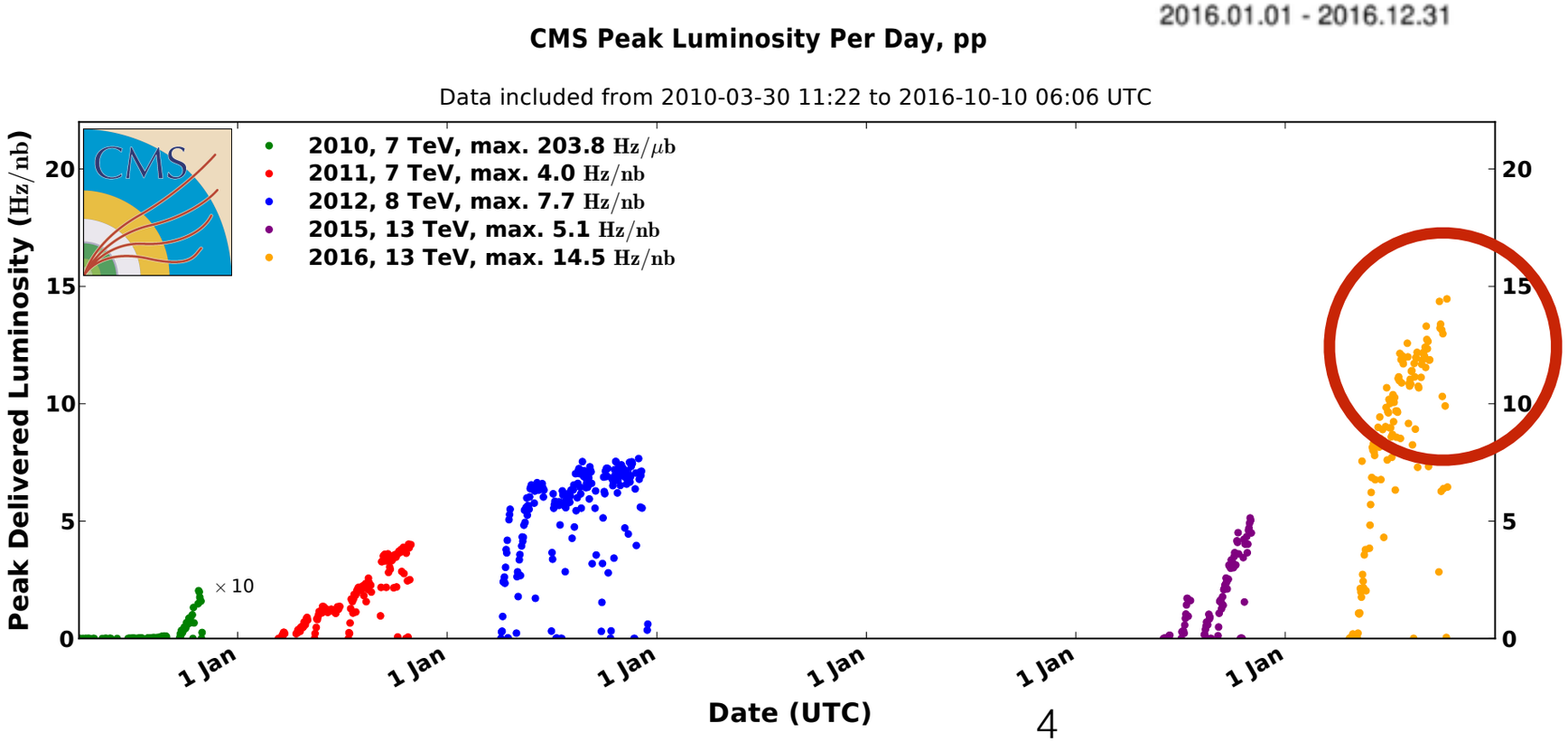
- 2.5km beta* run for TOTEM, no stable beams
- Intensity ramp-up after TS
  - includes van der Meer scan and low PU run
  - reduction of the crossing angle
- Machine development
- High pileup pp run (peak pileup was 87)
- Ion run coming up
  - p — Pb
  - Starting in November
  - 5 TeV and 8 TeV



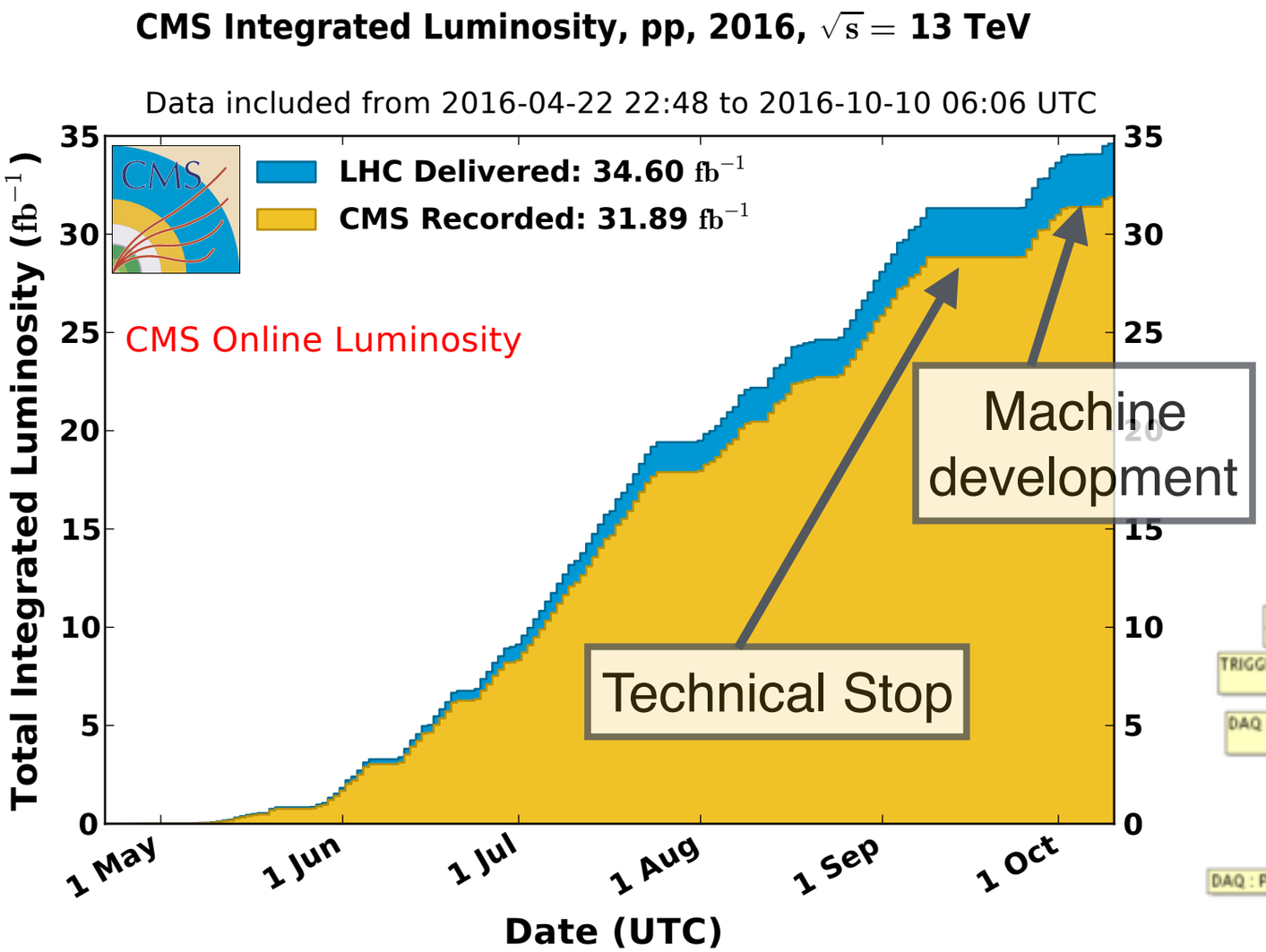
LHC Luminosity

- Crossing angle at CMS reduced to 280 μrad
- Reached **record peak instantaneous luminosity** of 1.45 $10^{34}cm^{-2}s^{-1}$ (peak pileup 47)



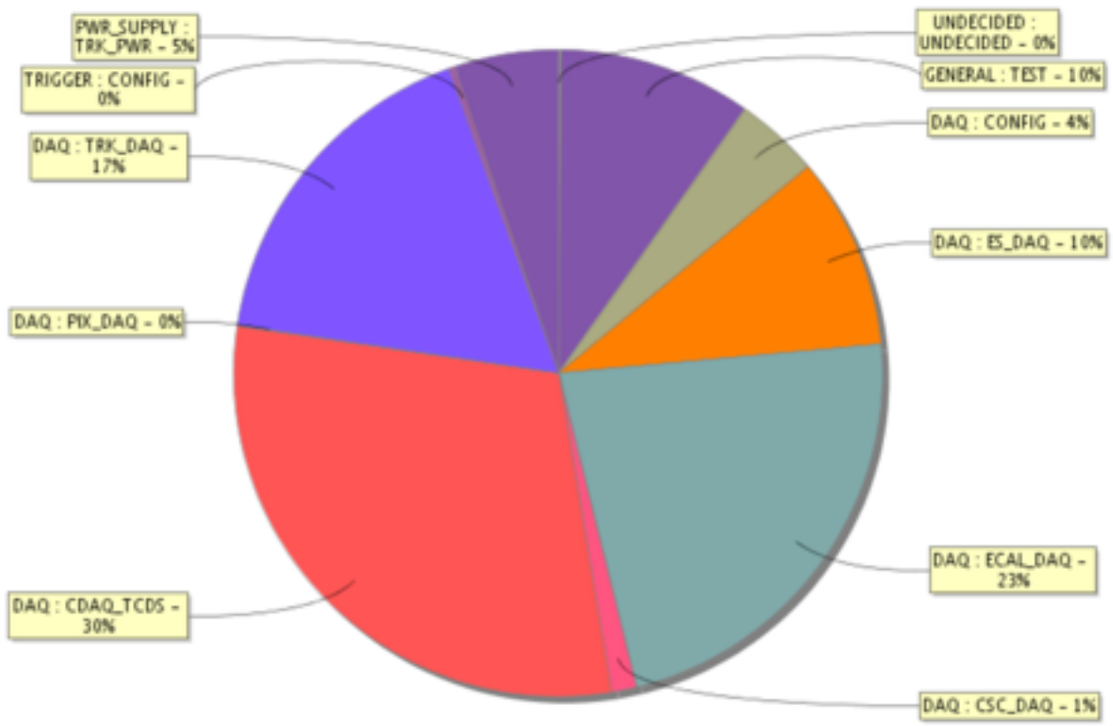


CMS recorded data

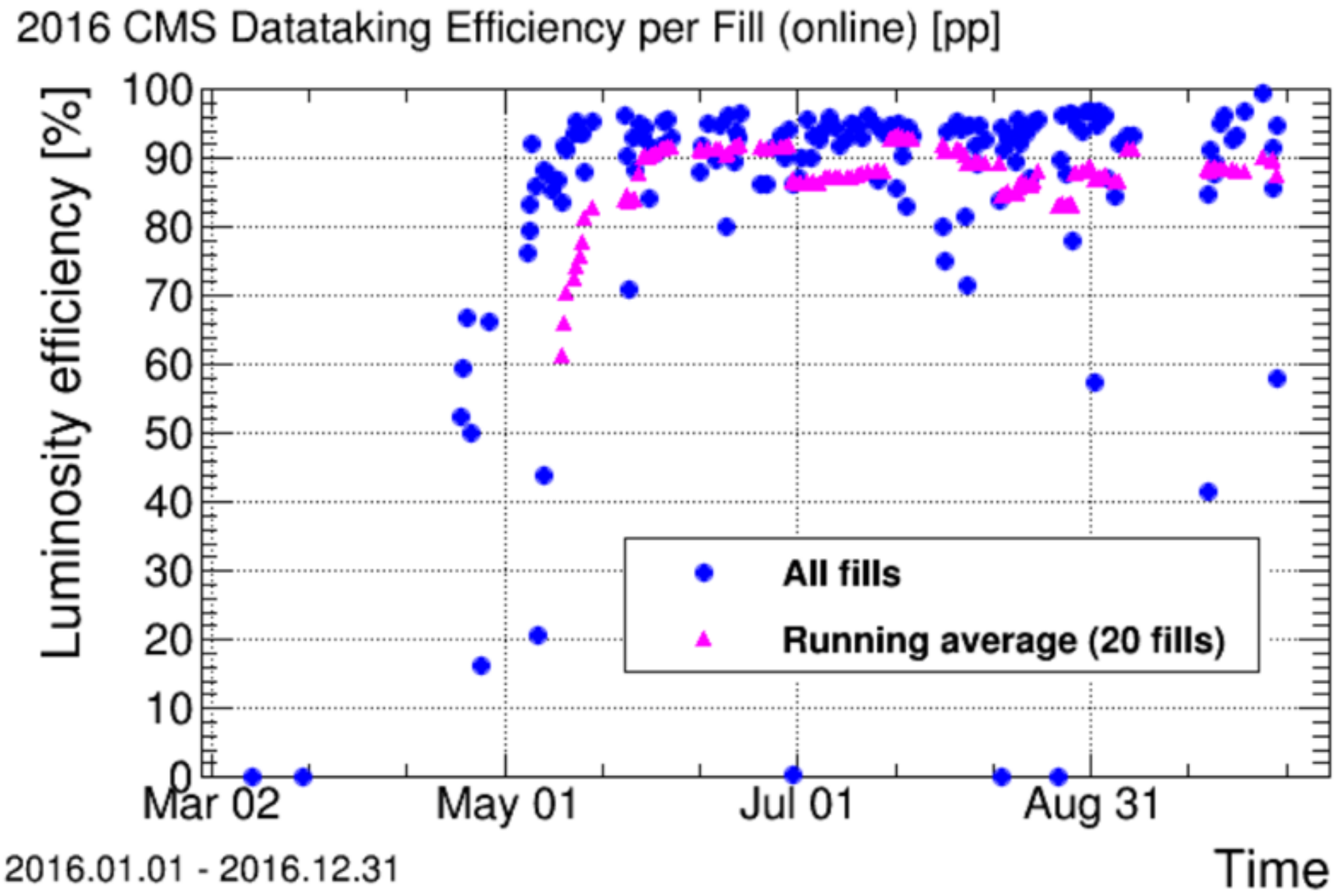


Main lost lumi cause:

- TCDS misconfigured by human mistake
  → action taken to avoid this in future



Data taking efficiency per fill



Fills since last report

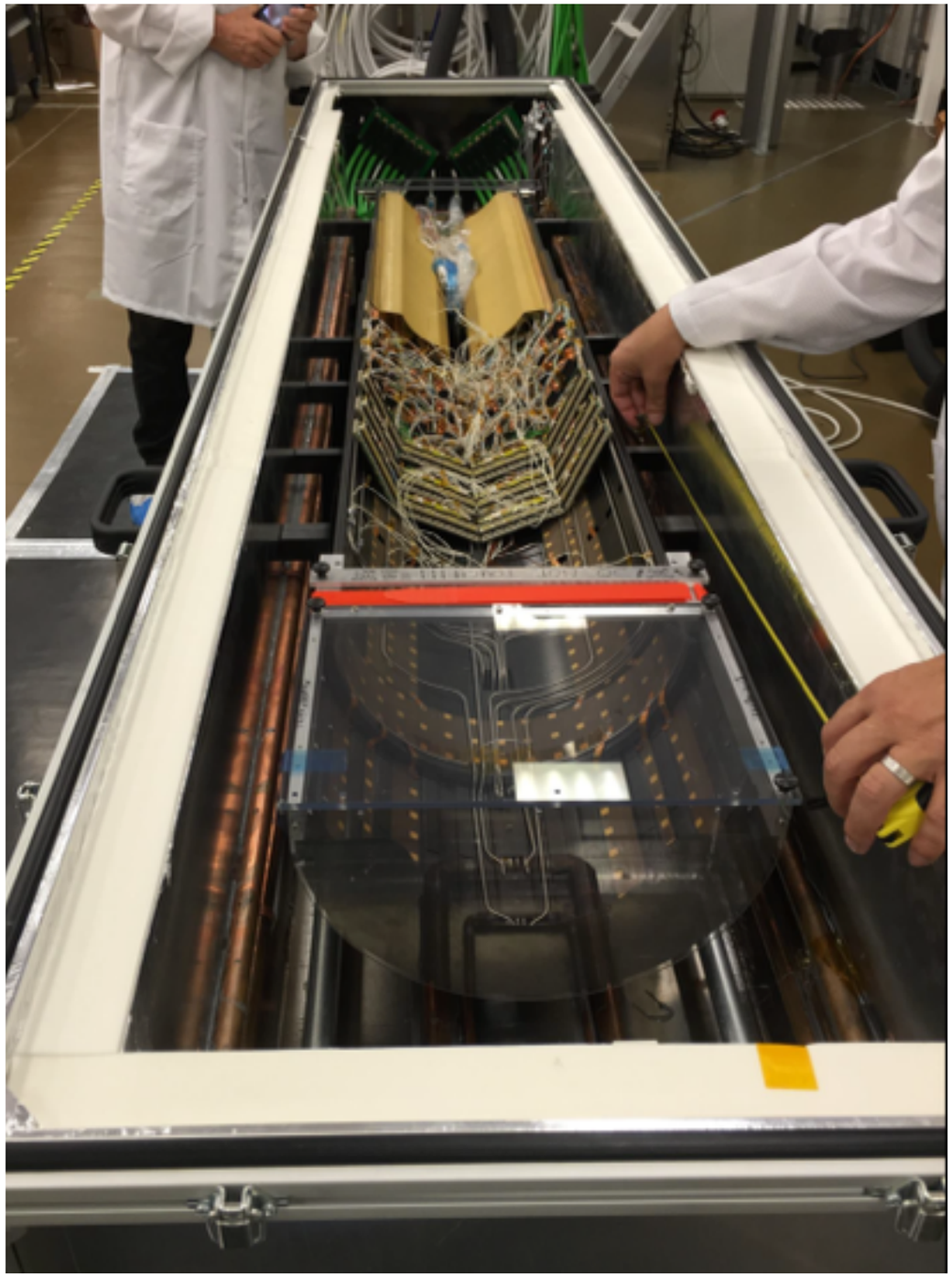
Fill	Begin Time *YYYY.MM.DD HH:MM*	Duration *HH:MM*	PeakInstLumi $\times10^{30}$cm^{-2}s^{-1} pp $\times10^{24}$cm^{-2}s^{-1} Ions	DeliveredLumi pb^{-1} pp μb^{-1} PbPb	RecordedLumi pb^{-1} pp μb^{-1} PbPb	EffByLumi %
5330	2016.09.25 01:04	02:26	20	0.1	0.1	41.5
5331	2016.09.25 06:02	05:15	698	11.3	9.6	84.7
5332	2016.09.25 14:14	02:19	2846	8.5	7.8	91.3
5338	2016.09.26 07:32	04:09	7627	88.2	77.5	87.9
5339	2016.09.26 14:40	16:30	14363	495.1	442.2	89.3
5340	2016.09.27 09:46	18:49	13228	493.6	469.4	95.1
5345	2016.09.28 12:03	13:19	13384	412.8	397.9	96.4
5351	2016.09.30 03:18	15:34	13151	201.5	186.7	92.6
5352	2016.09.30 21:29	12:58	12985	383.4	358.3	93.5
5355	2016.10.02 13:48	14:15	12998	405.9	392.6	96.7
5370	2016.10.06 11:31	00:44	9927	25.0	24.9	99.6
5385	2016.10.08 12:37	01:39	48	0.2	0.2	85.7
5386	2016.10.08 16:48	06:39	3615	11.2	10.2	91.6
5391	2016.10.09 08:35	00:52	13892	38.4	22.2	57.9
5393	2016.10.09 12:40	17:20	14509	498.8	472.2	94.7
5394	2016.10.10 14:11	00:42	13515	29.8	24.8	83.2
Summary		133:31	14509	**3103.8**	**2896.4**	**93.3**

★ Highest lumi, peak pileup ~47

★ High pileup run, peak pileup ~87

CMS status

- Taking physics data during stable beams
  - Since last update: extra 2.9 fb^{-1} recorded, at 93.3% data taking efficiency
  - For full year: ~92% data taking efficiency, ~95% of recorded data is certified as good for all physics
- Trigger menu adjusted to handle record luminosity
- Cosmic runs during LHC machine development
- Preparations for EYETS Phase1 upgrades well underway, example FPIX



Luminosity vs ATLAS

- Employ Z counting as luminometer
  - common between ATLAS and CMS
  - 1—2% uncertainty on measurement
  - complementary to other lumi measurements
- Preliminary CMS results agree with recorded luminosity
- Detailed comparison and synchronization with ATLAS ongoing