

# Update on H<sub>2</sub> Recombination

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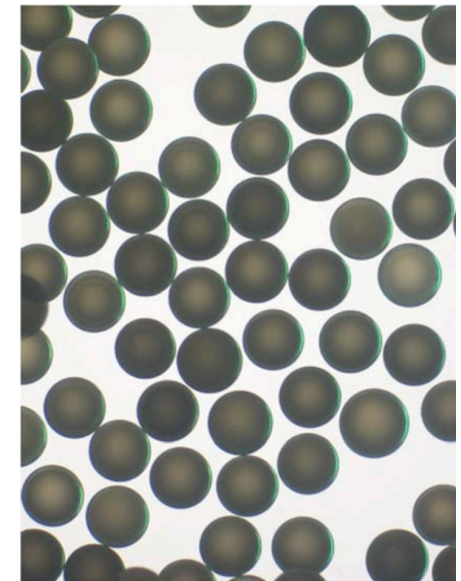


2020. 7. 9



- **New resin**

- Resins produced by LANXESS and its performance proved by EBARA
- I contacted the person in charge of the new resin and he was very interested in the application of this resin
- As a trial, this resin was put into one IE bottle for a test
  - 4L of the old resins were replaced with new ones
- To be tested during next beam time



Remove existing resins



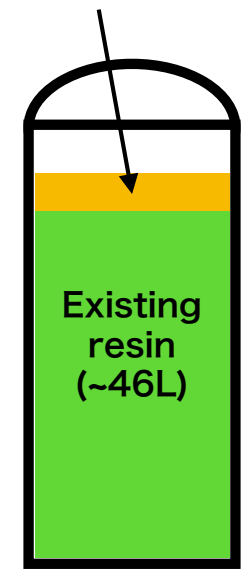
Put new resins



Completed IE bottle

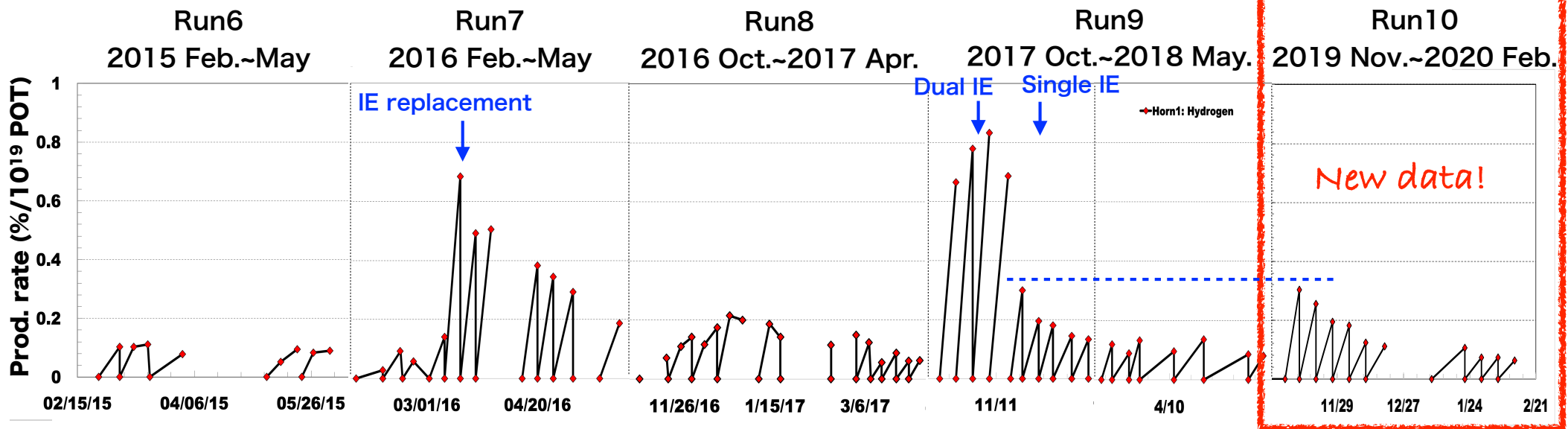


New resin (~4L)  
is overlaid



50 L in total

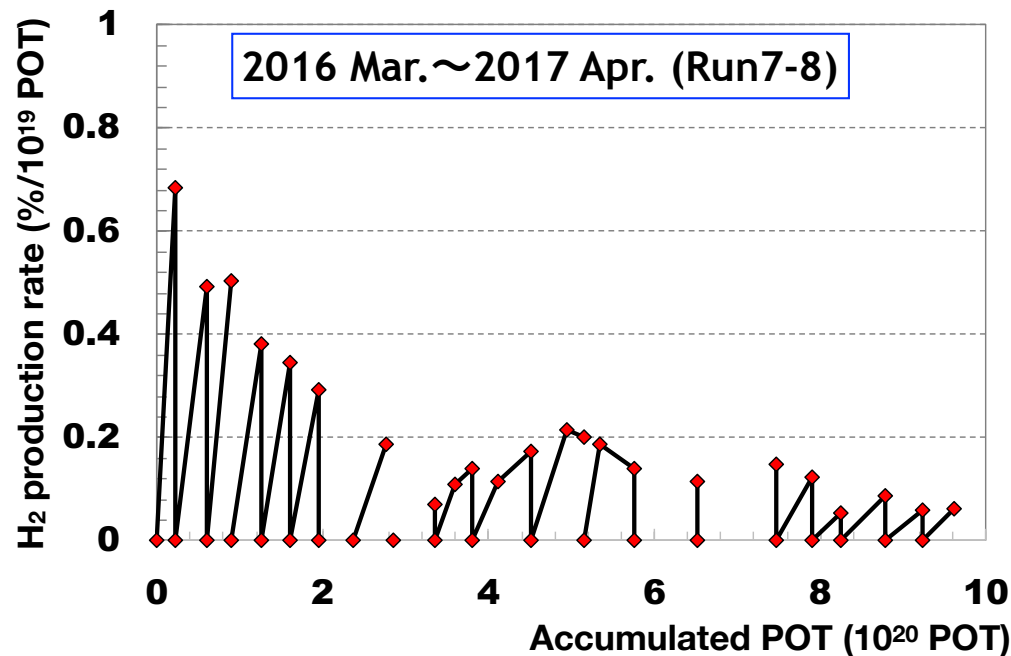
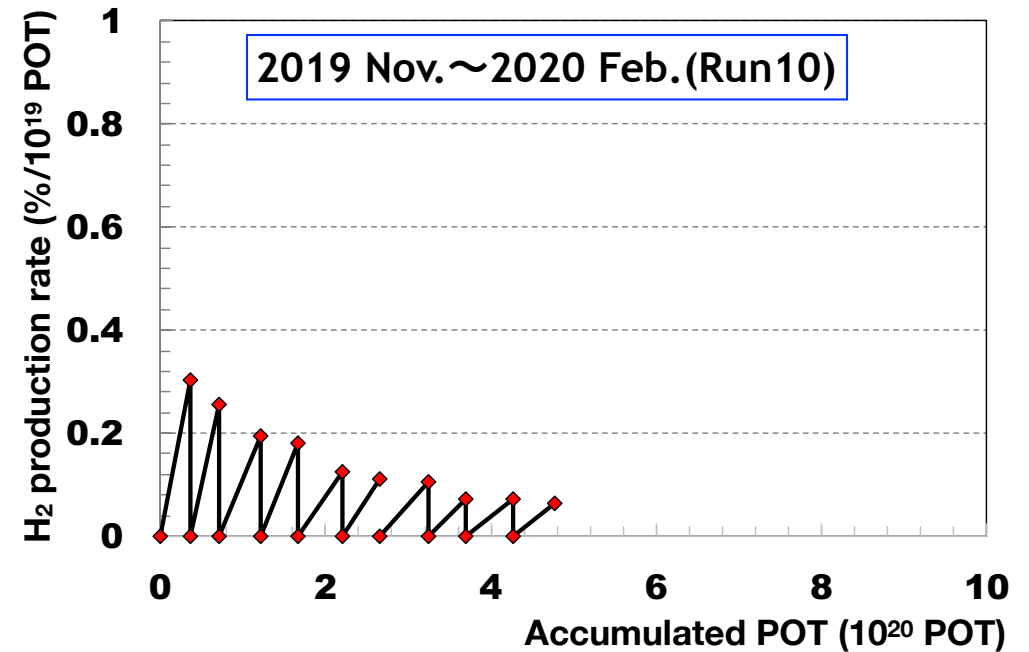
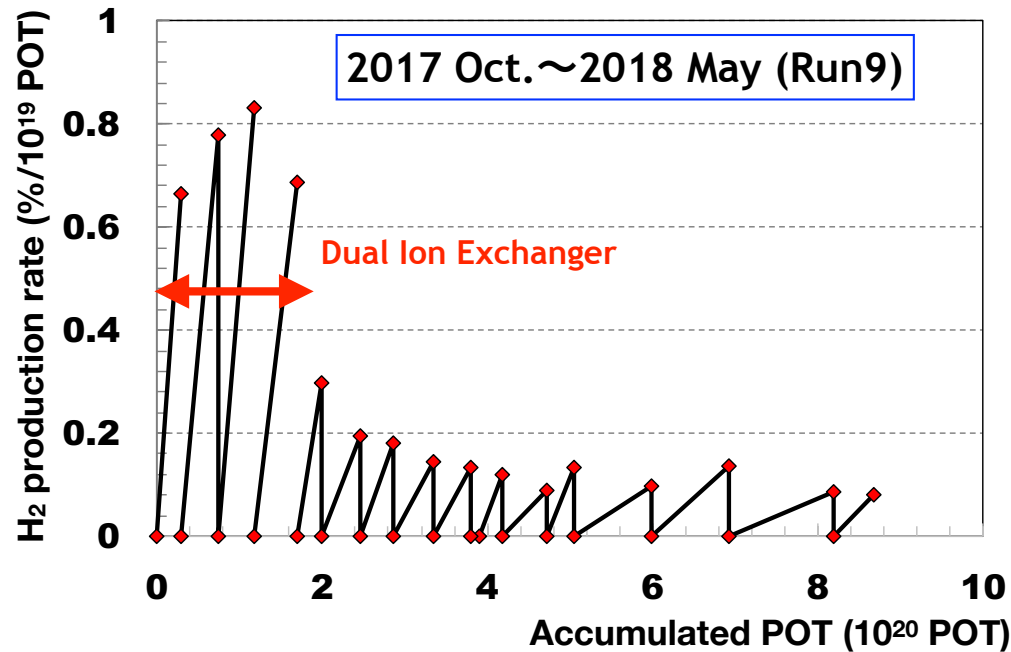
# Ion Exchanger Effect on H<sub>2</sub> Concentration



Run period	Run6	Run7	Run8	Run9-1	Run9-2	Run9-3	Run10-1	Run10-2
Configuration	Single (old)	Single (new)	Single (old)	Dual (new)	Single (new)	Single (new)	Single (new)	Single (new)
Beam power ( kW )	330	390	470	450	475	485	420~496	~515
H <sub>2</sub> concentration (%)	0.4	2.5	1.5	4.0	1.0	2.4	1.4	0.6
Production rate ( % / 10 <sup>19</sup> POT)	0.173	0.683	0.215	0.832	0.299	0.137	< 0.303	<0.106

- H<sub>2</sub> production rate rapidly increased after Ion exchanger replacement
- Production rate with new Ion Exchanger (IE) is almost comparable to that with usual new IE

# H<sub>2</sub> Production Rate



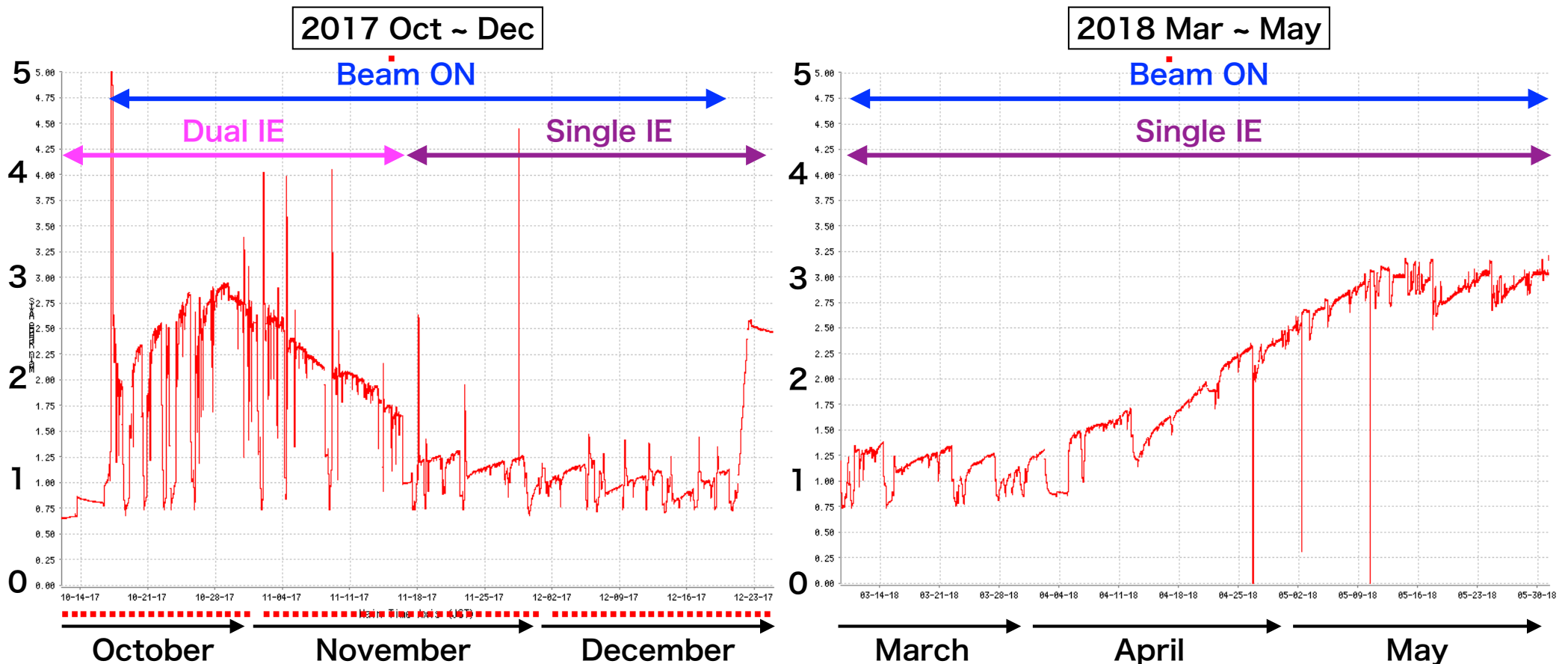
- H<sub>2</sub> production rate after IE exchange
  - Run7 (single) → 0.7%/10<sup>19</sup> POT
  - Run9 (dual) → 0.85%/10<sup>19</sup> POT
  - Run10 (single) → 0.3%/10<sup>19</sup> POT
- H<sub>2</sub> production rate after IE exchange is smaller with new IE



# Water Conductivity Trend in Past Runs

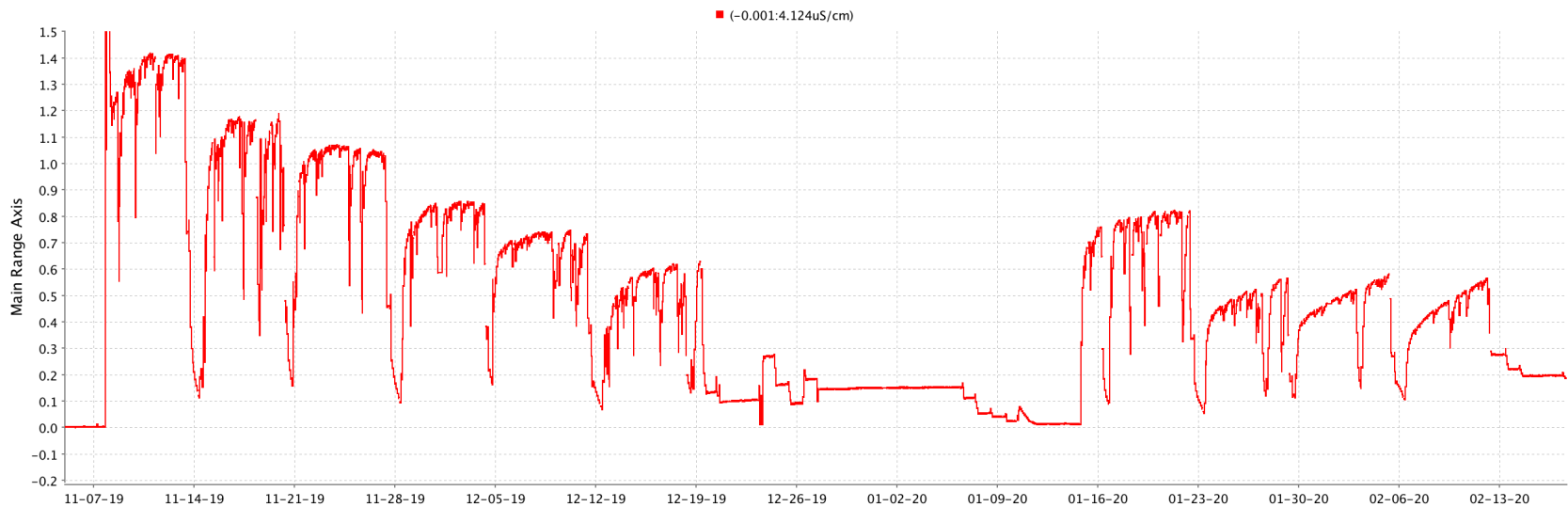
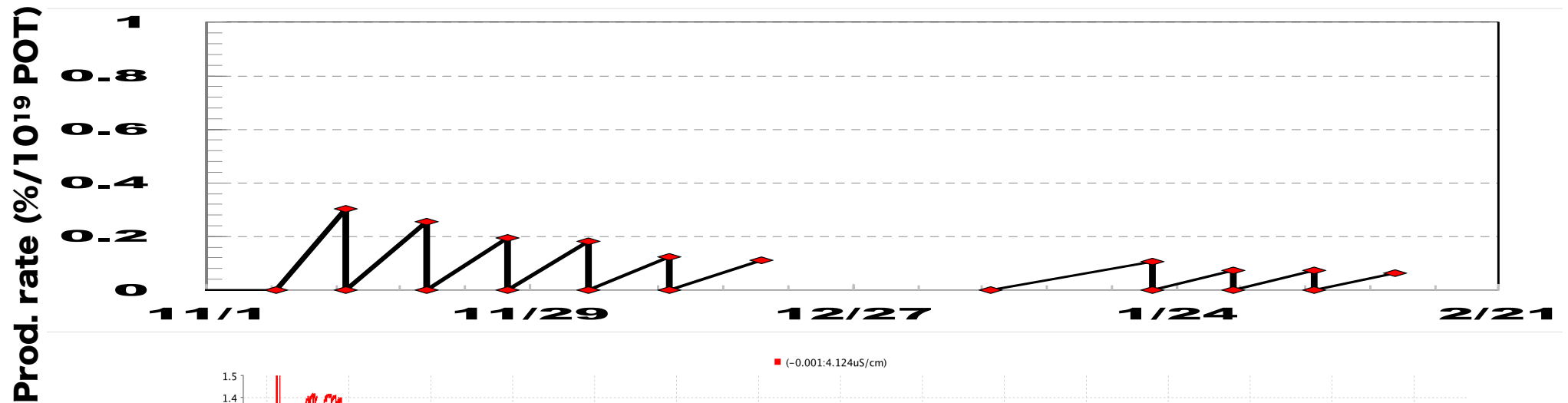
- **Water conductivity**

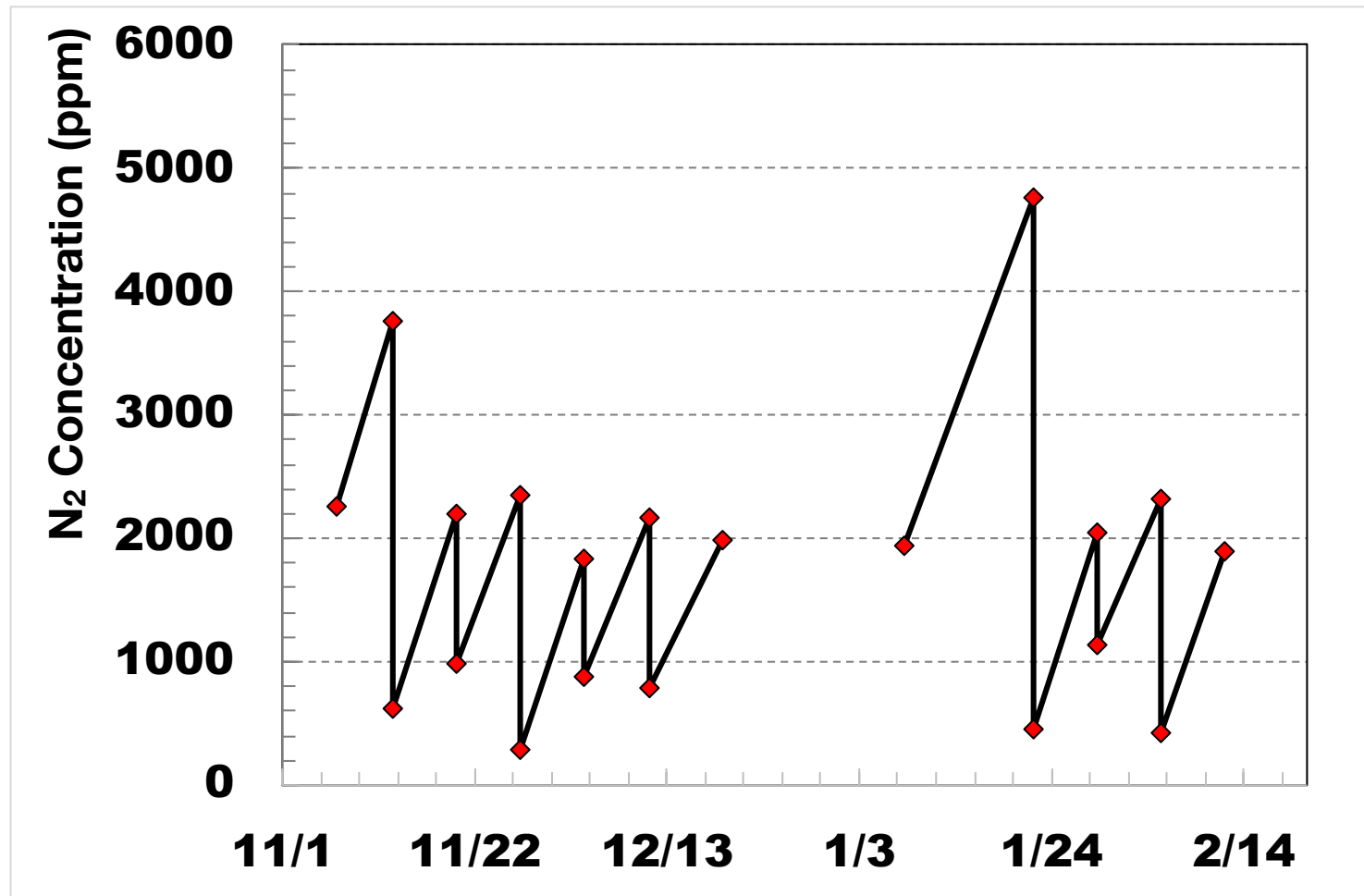
- A strange behavior during dual IE operation
- Low conductivity during single IE operation, **but still increased in a week**
- Conductivity got increased around middle of April
  - This indicates lifetime of IE  $\Rightarrow$   **$\sim 6.0 \times 10^{20}$  POT (or 2~3 months)**





- Both H<sub>2</sub> production rate and conductivity got decreased as beam power increased
- Conductivity is quite stable → Might be increased in later period (Jan.23~)?
  - Accumulated POT until Jan. 23 is  $3.23 \times 10^{20}$  POT ( $\leftrightarrow 5.43 \times 10^{20}$  POT in previous IE)
- Concentration of dissolved N<sub>2</sub> may affect this





- Air is contaminated into horn gas volume from somewhere
- N<sub>2</sub> concentration increased after water dilution
- Nitric acid is created by beam exposure → can be removed by IE
- De-gasifier system will improve this situation

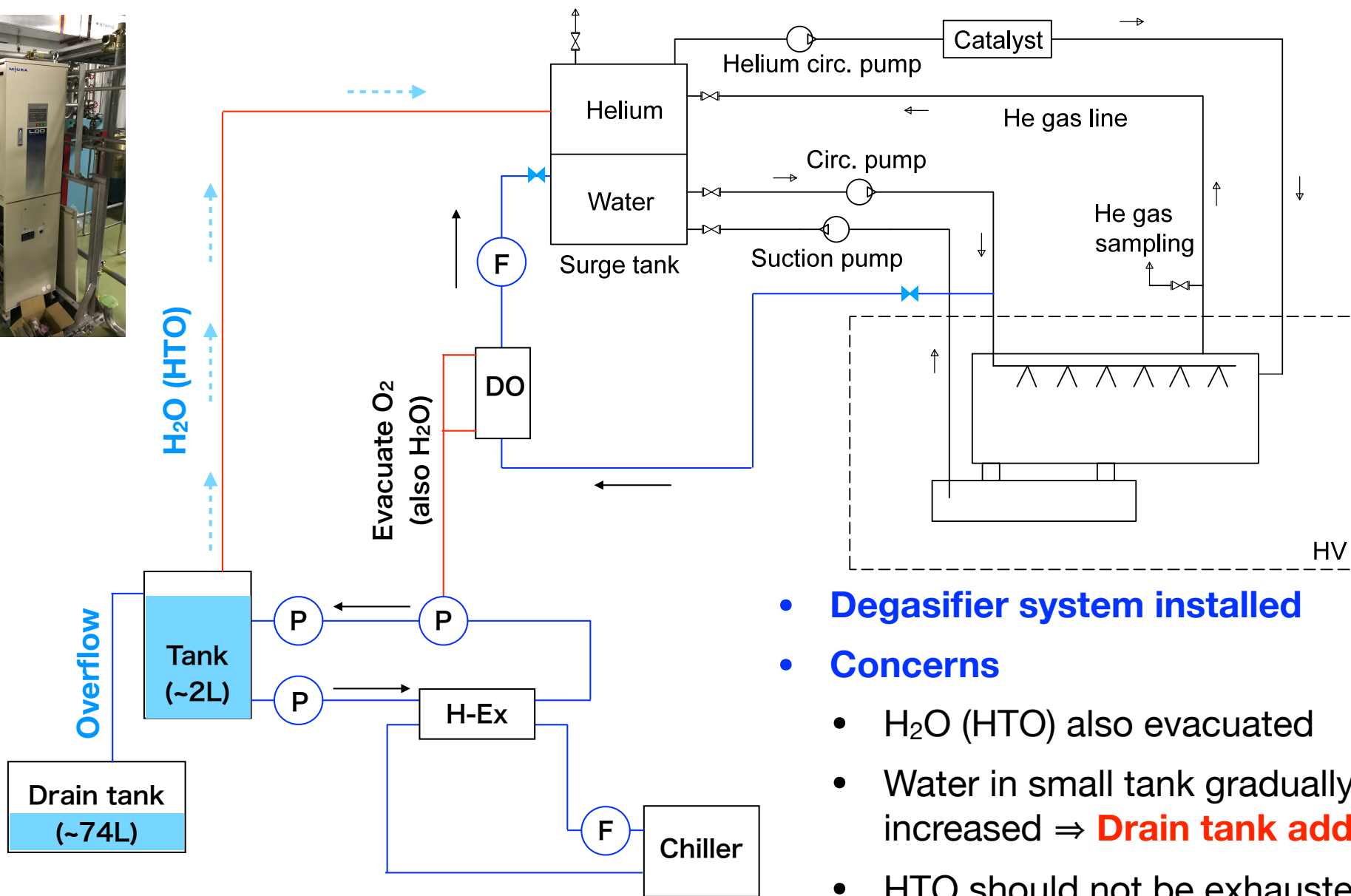


# Status of De-gasifier System



- Most of components were installed
- Commissioning of whole system to be done in this summer
- Its performance will be checked in next beam time





- **Degasifier system installed**
- **Concerns**
  - H<sub>2</sub>O (HTO) also evacuated
  - Water in small tank gradually increased ⇒ **Drain tank added**
  - HTO should not be exhausted to the air ⇒ **Return to water tank**