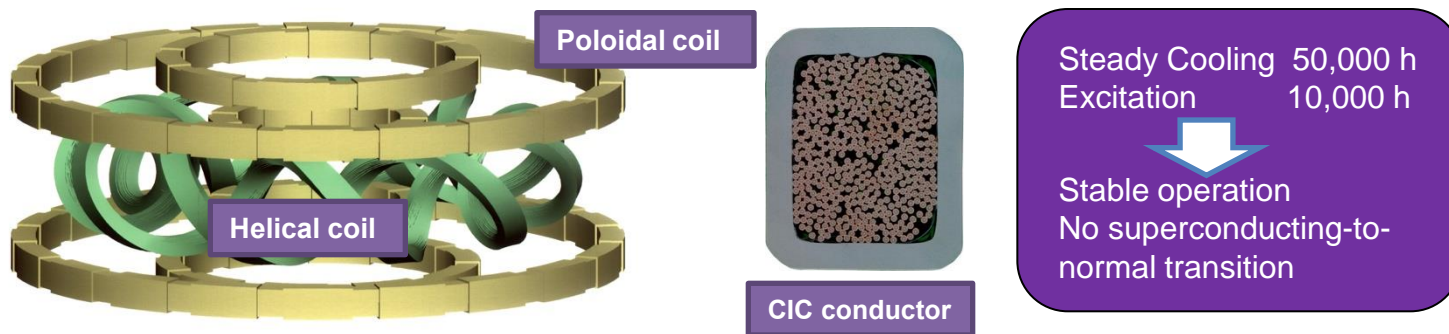




# Lessons Learned from Eighteen Year Operation for the LHD Poloidal Coils Made from CIC Conductors

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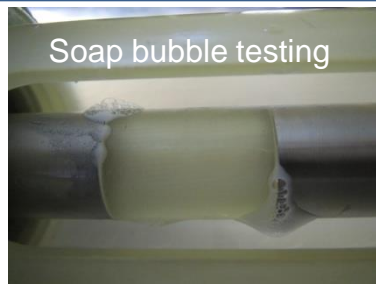
The experience gained from **eighteen years of operation** has provided further useful information

- Preventive design and maintenance
- Long-term changes in characteristics

### Malfunction of Quench Detection System

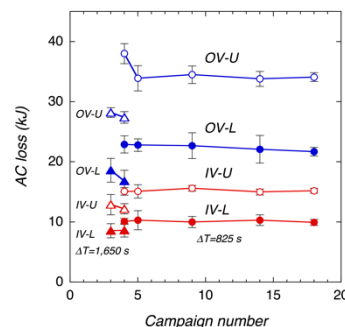
- 9 malfunction events
- Noise from NBI
- Out-of-balance voltage due to coupling currents
- No malfunction since 2010 thanks to various measures

### Helium Leak from Insulation Break



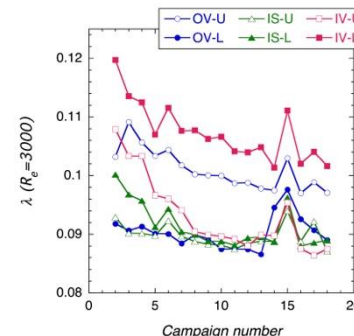
- Sudden helium leak during the 16<sup>th</sup> cool-down
- Replaced all breaks

### Long-Term Changes in AC Loss



Almost unchanged

### Long-Term Changes in Hydraulic Characteristics



Decreasing tendency

in good condition