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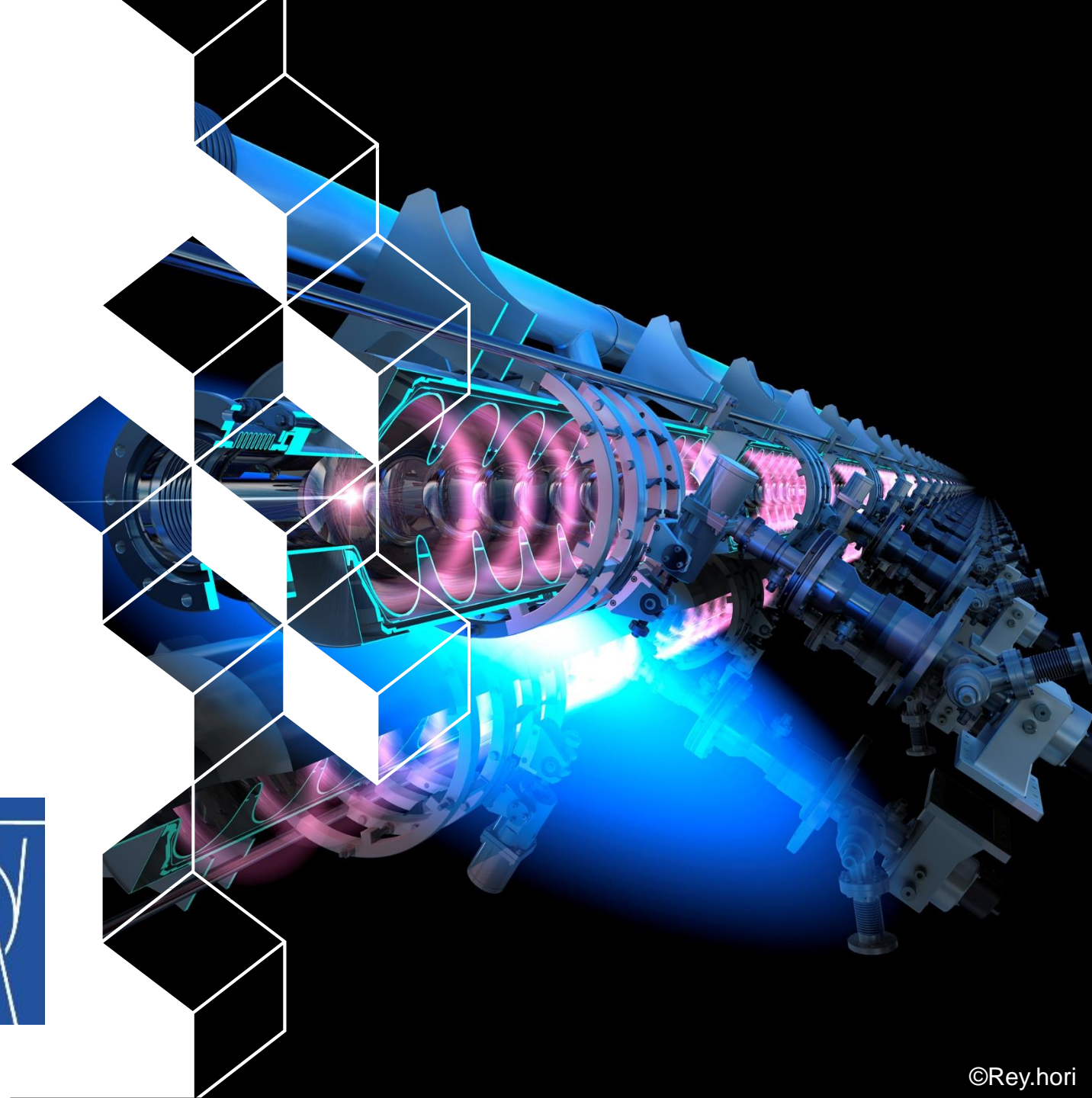
## Cavities and cryomodule update

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- Overview of cavities and cryomodules activities/scope
- Recent update

# Cavities and cryomodule group activities and scope



To this day the collaboration around cavities and cryomodules has two main scopes:

- 1. Demonstrate a robust and reliable industrialization process for cavities fabrication**
- 2. Assemble a high-performance cryomodule in Japan**

Main milestones (first 2 years):

- Define and validate a cavity preparation recipe (2 single cells *not* 3)
  - Manufacture cavities in EU that are compliant with HPGS (Japan gas safety law)
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- KEK plans to send base material for cavity fabrication (Nb, NbTi, and Ti) and funding (cash) for at least 2 years
  - Nb material will be half fine grain (FG) and half medium grain (MG), the latter is a new material that needs to be validated concerning mechanical and RF performance



Year	Activities
1	<ul style="list-style-type: none"><li>➤ 3 single cells manufacturing (material+mech)</li><li>➤ 3 surface preparations</li><li>➤ 10 vertical tests</li><li>➤ CM design and HPGS</li><li>➤ Surface treatments analysis</li></ul>
2	<ul style="list-style-type: none"><li>➤ 2 9-cells cavity manufacturing (material+mech)</li><li>➤ 2 surface treatments</li><li>➤ 2 retreatments</li><li>➤ 5 vertical tests</li><li>➤ CM design</li></ul>
3	<ul style="list-style-type: none"><li>➤ 2 9-cells cavity manufacturing (material+mech)</li><li>➤ 2 surface treatments</li><li>➤ 1 retreatment</li><li>➤ 4 vertical tests</li></ul>
4	<ul style="list-style-type: none"><li>➤ 4 9-cells cavity manufacturing (material+mech)</li><li>➤ 4 surface treatments</li><li>➤ 1 retreatment</li><li>➤ 6 vertical tests</li><li>➤ Cavity production yield statistics</li></ul>

# Cryomodule plan

- Cryomodule design will take advantage of EU-XFEL and LCLS2 experience
- 8 cavities: 6 from JP, 1 from the EU, and 1 from the US
  - All cavities in the CM shall fulfill Japanese High Pressure Gas Safety regulations (we will start a detailed discussion this summer with EAJADE support)
  - The cavities yield should be >90%
  - Required performance (*from TDR*)



Phase	Operation		Maximum	
	$E_{\text{acc}}$ [MV/m]	$Q_0$ [ $10^{10}$ ]	$E_{\text{acc}}$ [MV/m]	$Q_0$ [ $10^{10}$ ]
Vertical test	31.5	>1.0	35	>0.8
Cryomodule	31.5	>1.0		

