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## **Beam coupling impedance contribution of flange aperture gaps: a numerical study for Elettra 2.0**

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The accurate analysis of any possible source of beam instability is mandatory for the design of a new particle accelerator, especially for high current and ultra low emittance synchrotrons. In the specific case of instabilities driven by the coupling between the charged particle beam and the electromagnetic field excited by the beam itself, the corresponding effect is estimated through the beam coupling impedance. The modeling of this effect is fundamental to perform a rigorous evaluation of the coupling impedance budget able to account for all devices present in the entire machine. To deal with this problem, this paper focuses on the estimation of the contribution of the joints lying between the different vacuum chamber sections, by performing a comparative numerical analysis that takes into account for different aperture gaps between the flanges. The results point out the criticality of many small-impedance contributions that, added together, must be lower than a predefined impedance threshold.

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### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

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