

Development of the KRISS Kibble Balance II

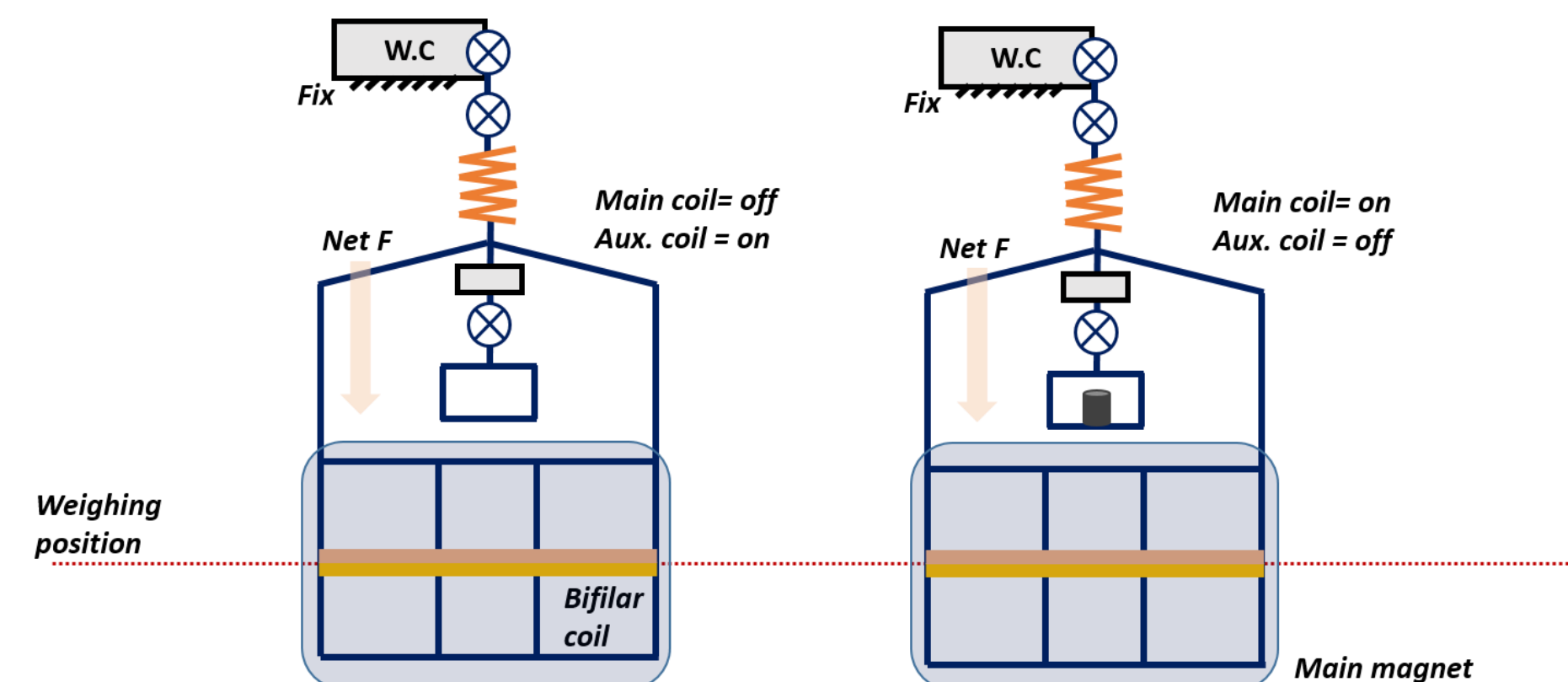
Name : MyeongHyeon Kim*, Dongmin Kim, Minky Seo, Sung Wan Cho, and Kwang-Cheol Lee
Quantum Mass Measurement Group, Quantum Technology Institute, Korea Research Institute of Standards and Science (KRISS)
E-mail : mhkim@kriss.re.kr

Abstract

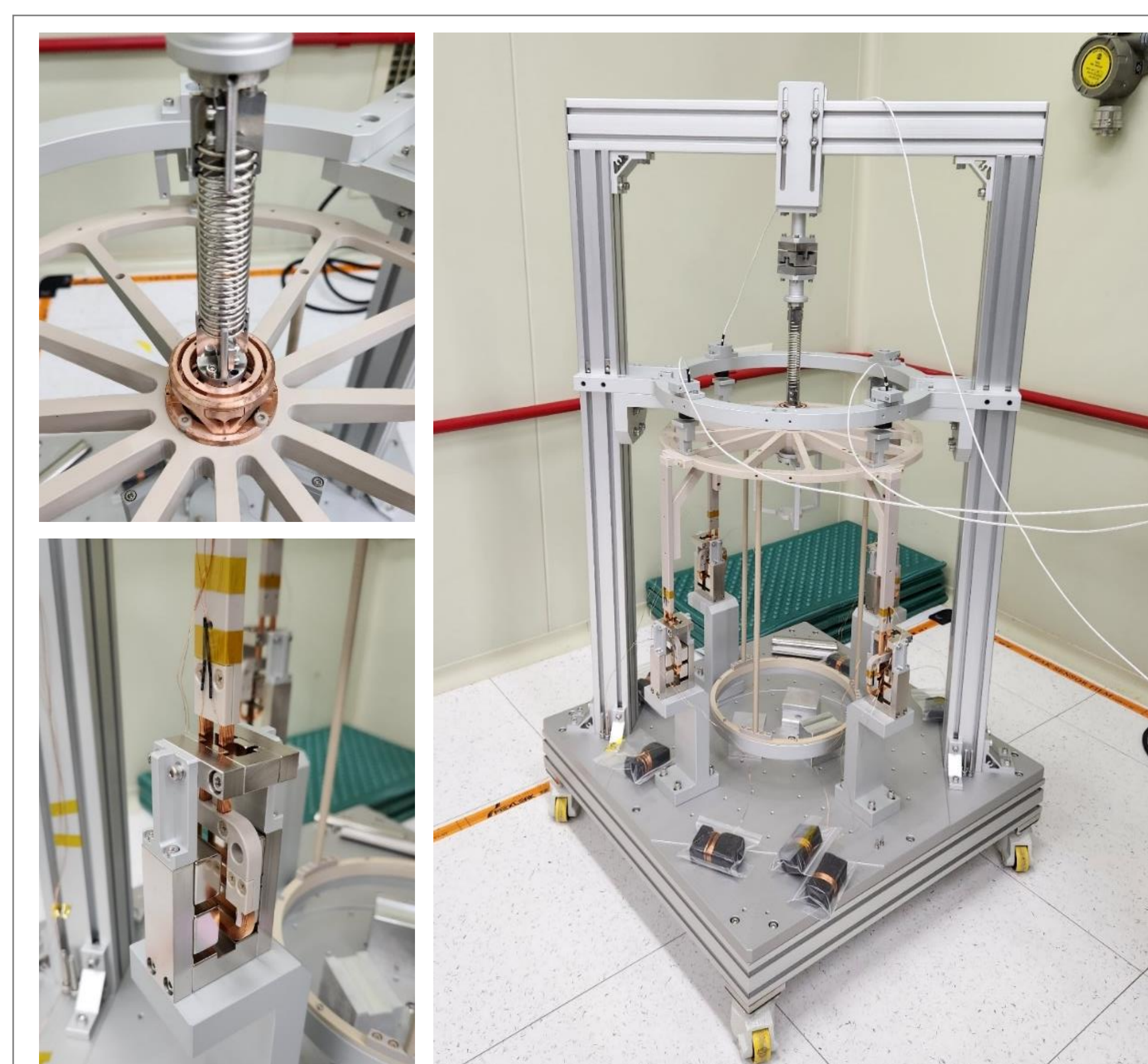
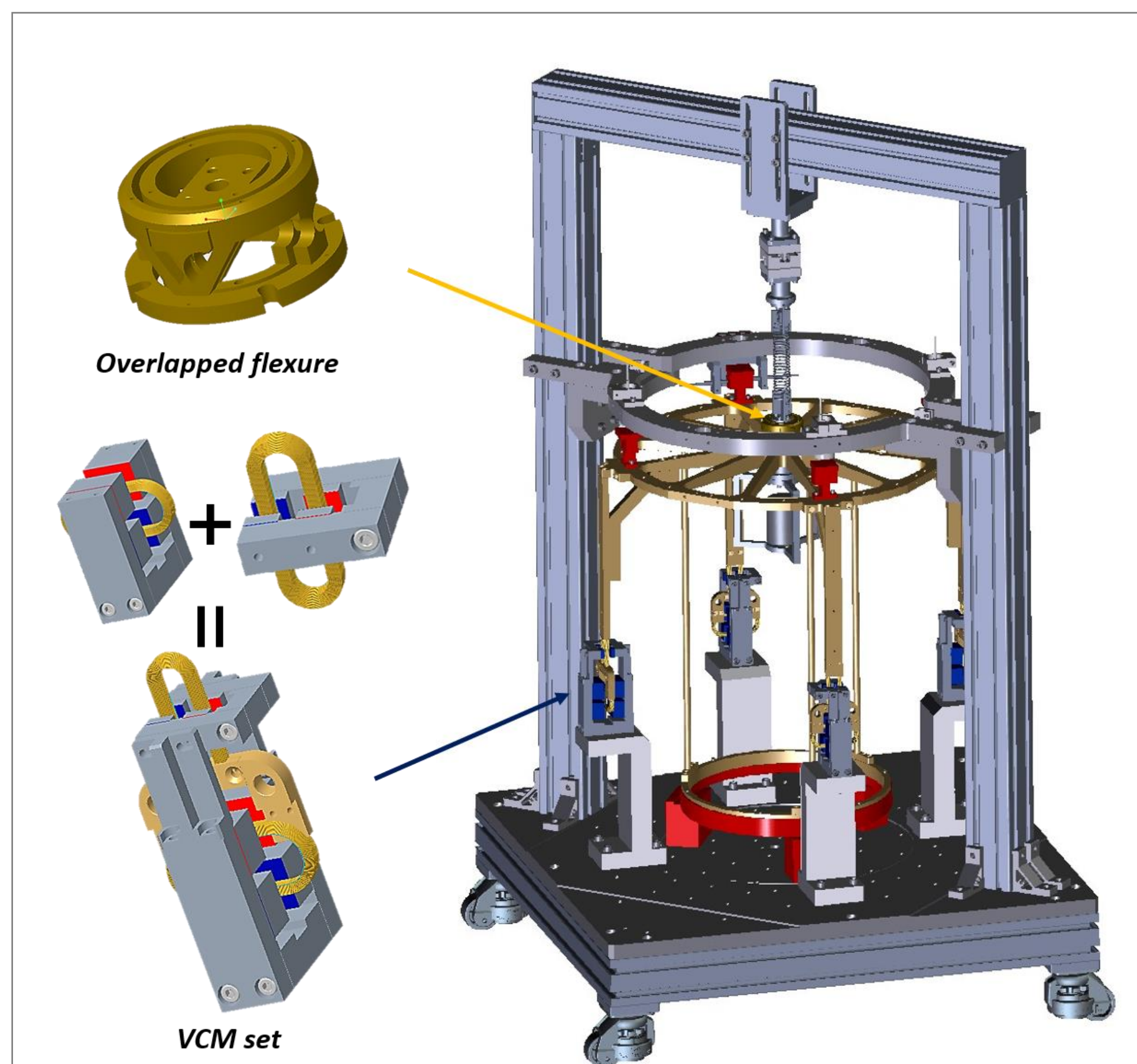
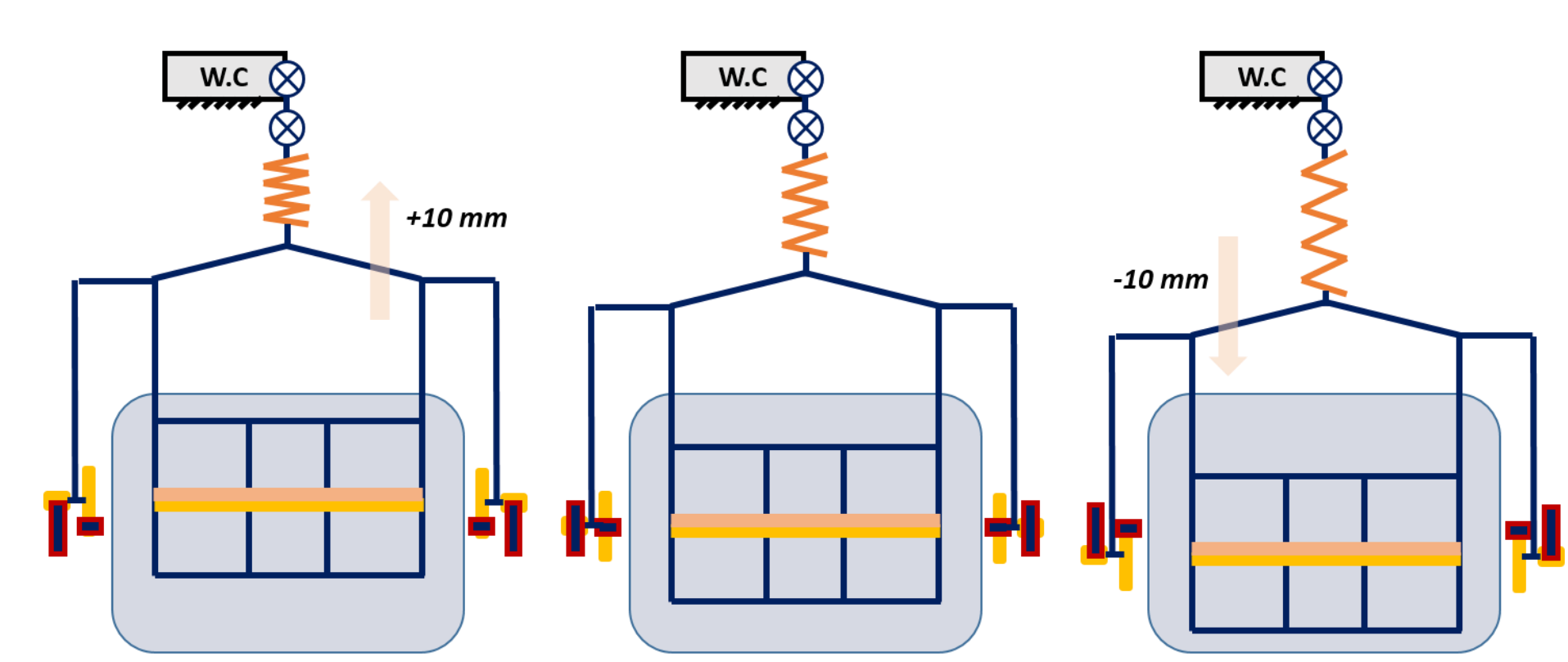
The Korea Research Institute of Standards and Science (KRISS) is developing the KRISS Kibble Balance II to enhance its existing system. The redesigned balance uses custom voice coil motors to control the six degrees of freedom (DOF) of the main coil suspension, minimizing parasitic motion and ensuring vertical movement. A simple spring replaces a complex guide structure, improving maintenance and directly linking the mass comparator in weighing mode to transmit the Lorentz force without interference. A prototype was built to validate this design, with control systems and experiments confirming its stability. The final KRISS KB-2 will be developed based on these results.

PROTOTYPE OF THE KRISS KIBBLE BALANCE II

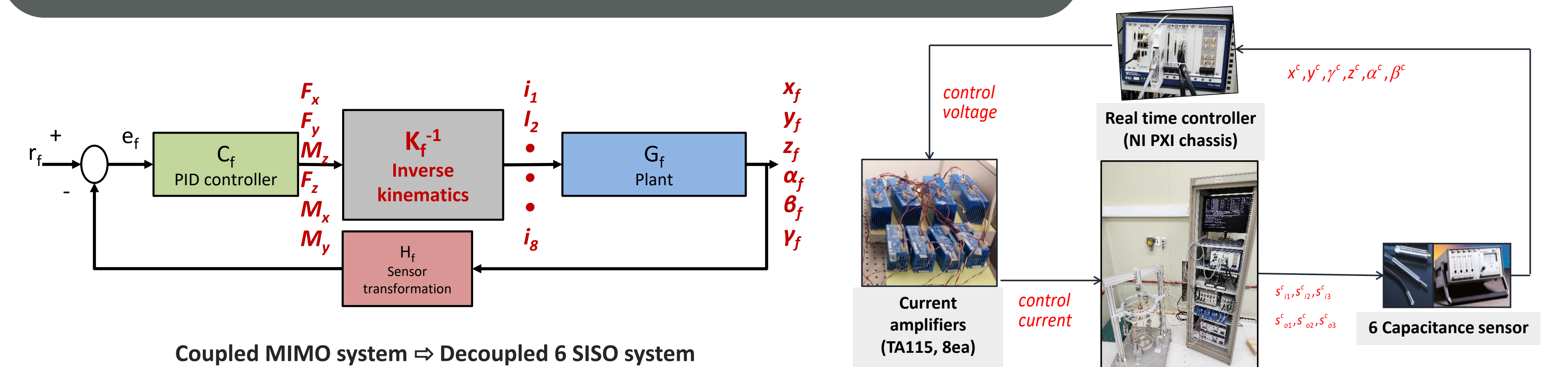
Weighing mode



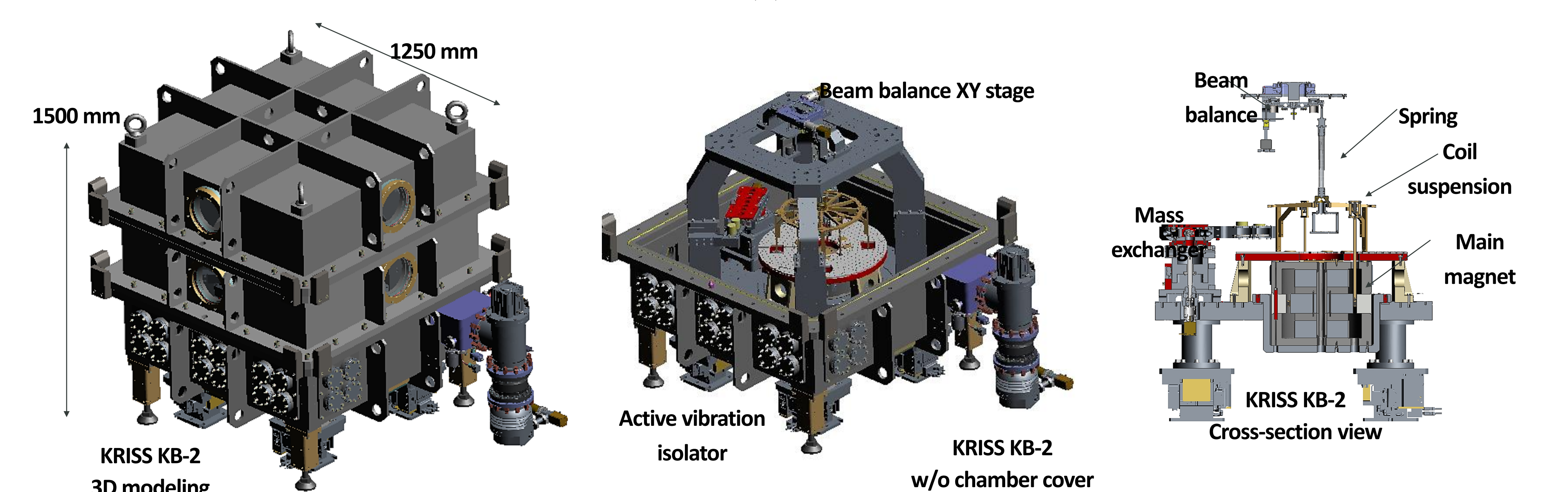
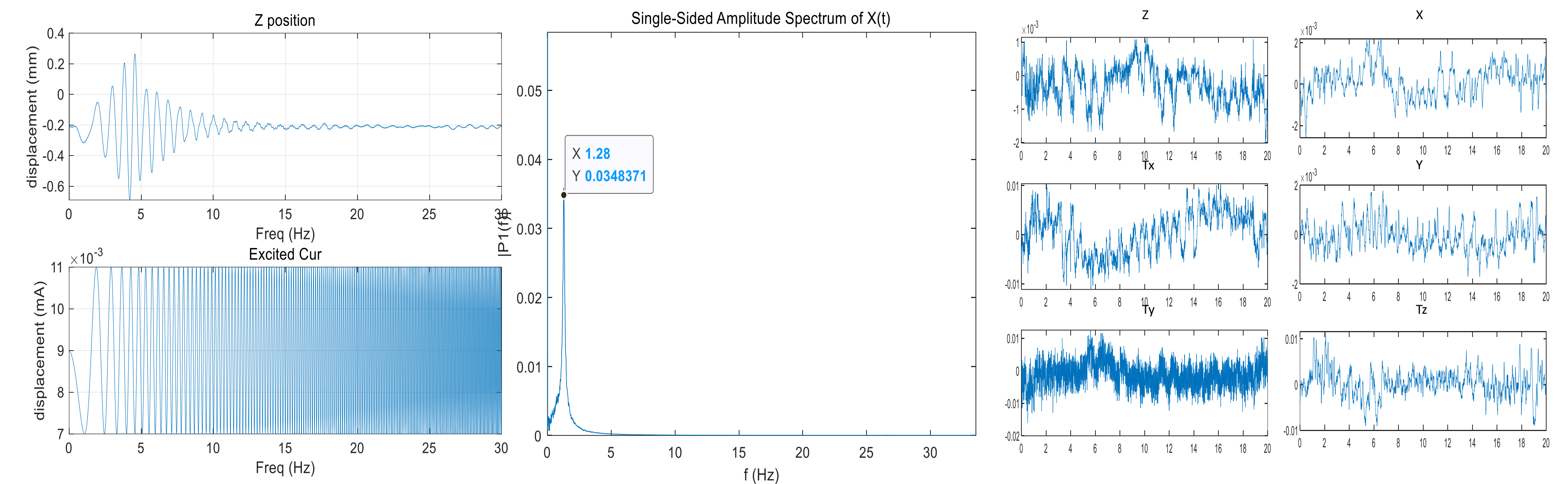
Moving mode



Preliminary test for moving mode



Coupled MIMO system $\Rightarrow$ Decoupled 6 SISO system



Conclusion

A new Kibble balance design for KRISS KB-2 replaces a complex guide with a spring and custom voice coil motors, enabling full 6-DOF control. A prototype demonstrated excellent stability and motion performance, guiding the ongoing assembly of the final system.

Reference

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