

HOW TO RECYCLE A SYNCHROTRON?

BDN PROJECT MISSION

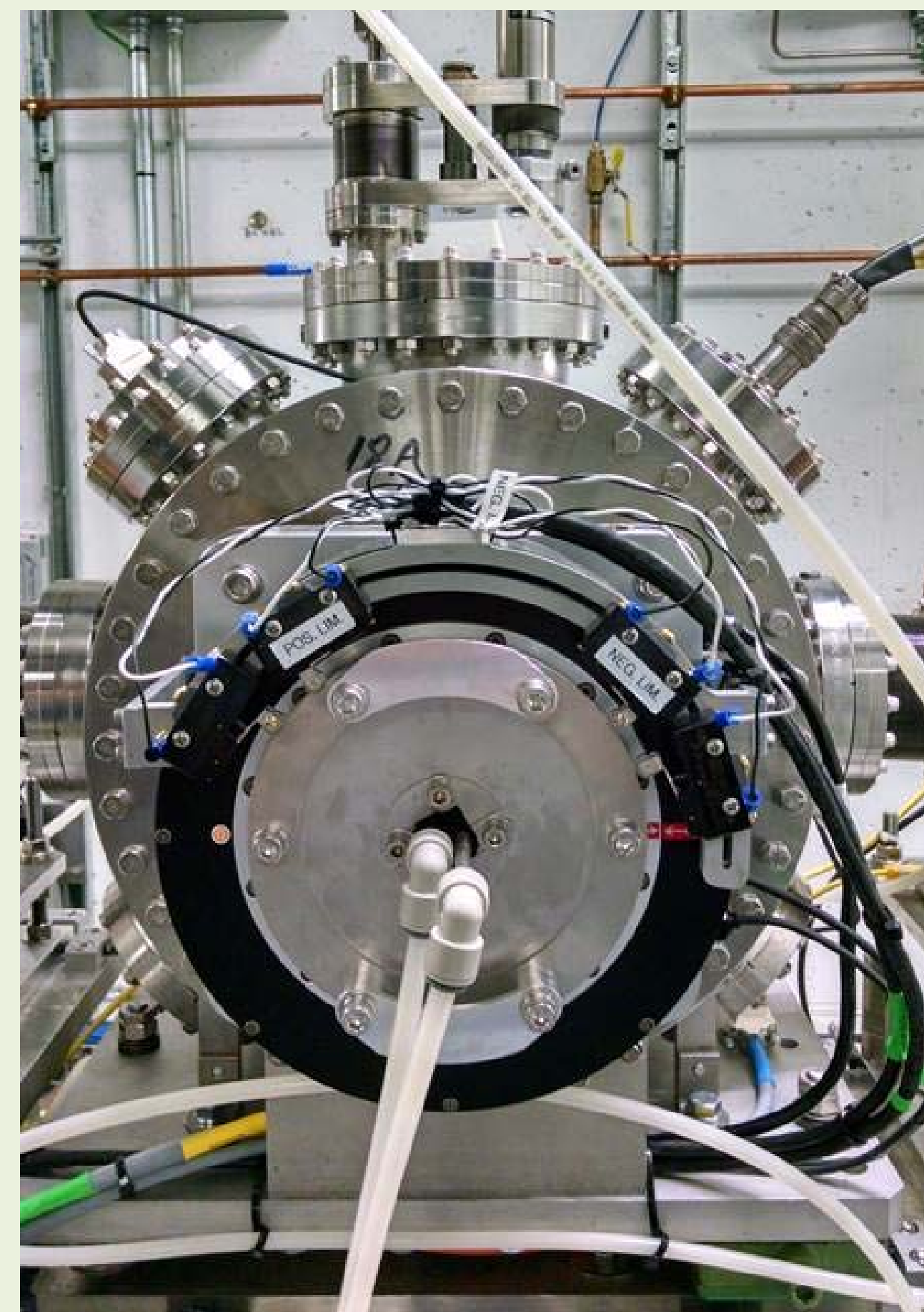
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Introduction

With many synchrotron facilities retiring or going through upgrades, what is the future of some of the state-of-the-art equipment and the beamlines built for a specific science at these older facilities? Can the past investments continue supporting the current scientific mission? The Beamlines Developed by NSLS-II (BDN) are reusing scientifically valuable equipment recovered from the now shuttered NSLS.

SOME OF THE RECOVERED INSTRUMENTS



QAS monochromator retrofitted with Direct Drive Nikki Denso servomotor with 3.6Mct/rot



CMS monochromator controls were modified to conform to the NSLS-II standards.

Beamlines

Complex Material Scattering

CMS 11-BM

and

Tender Energy X-ray Absorption Spectroscopy

TES 8-BM

Construction completed in 2016, had its first light in August 2016 and started general-user operations in 2017

X-ray Fluorescence Microprobe **XFM 4-BM**

and

Quick x-ray Absorption and Scattering

QAS 7-BM

First light in September 2017, and plan to take general users in 2018.

Frontier Synchrotron Infrared Spectroscopy/Time-Resolved Optical Spectroscopies

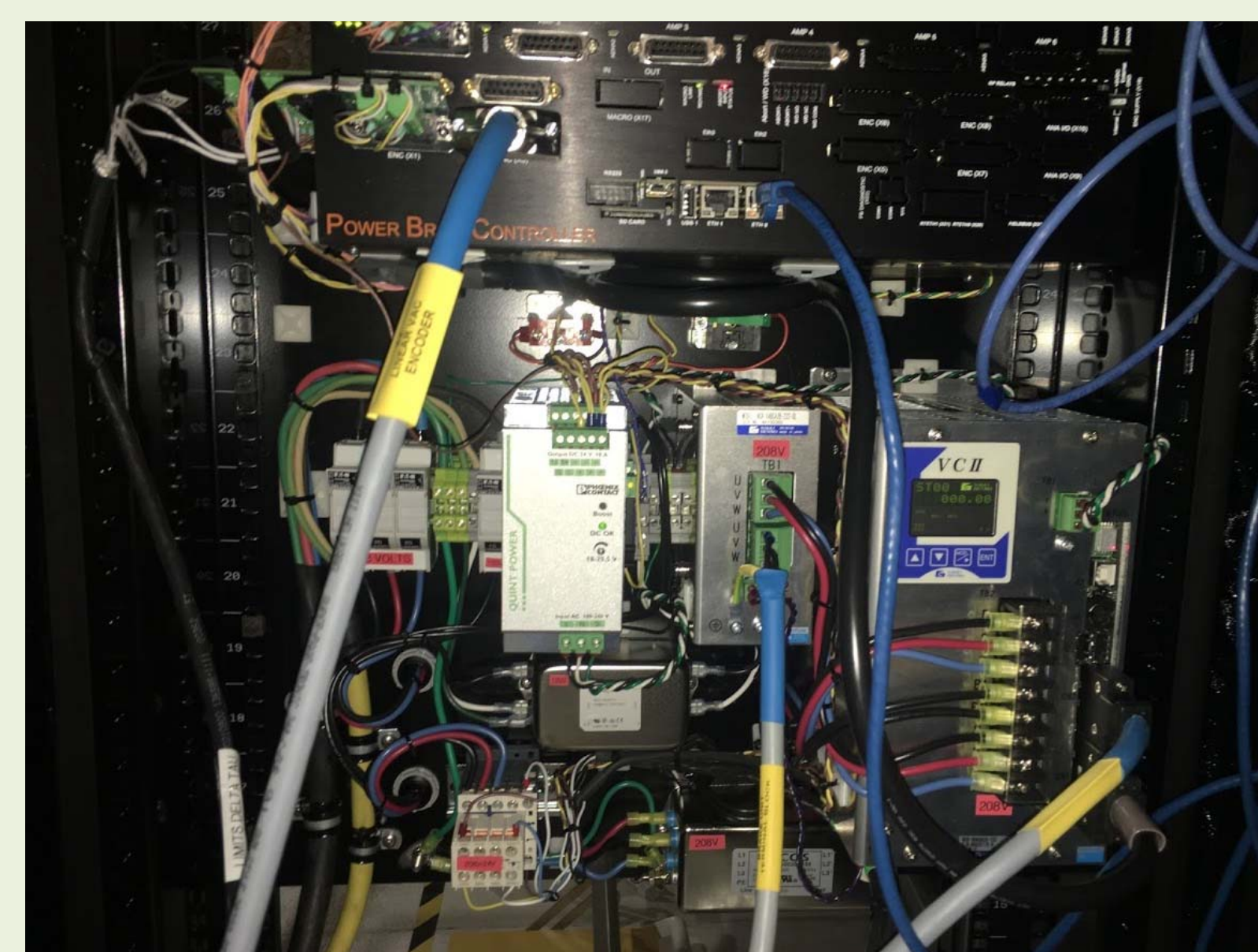
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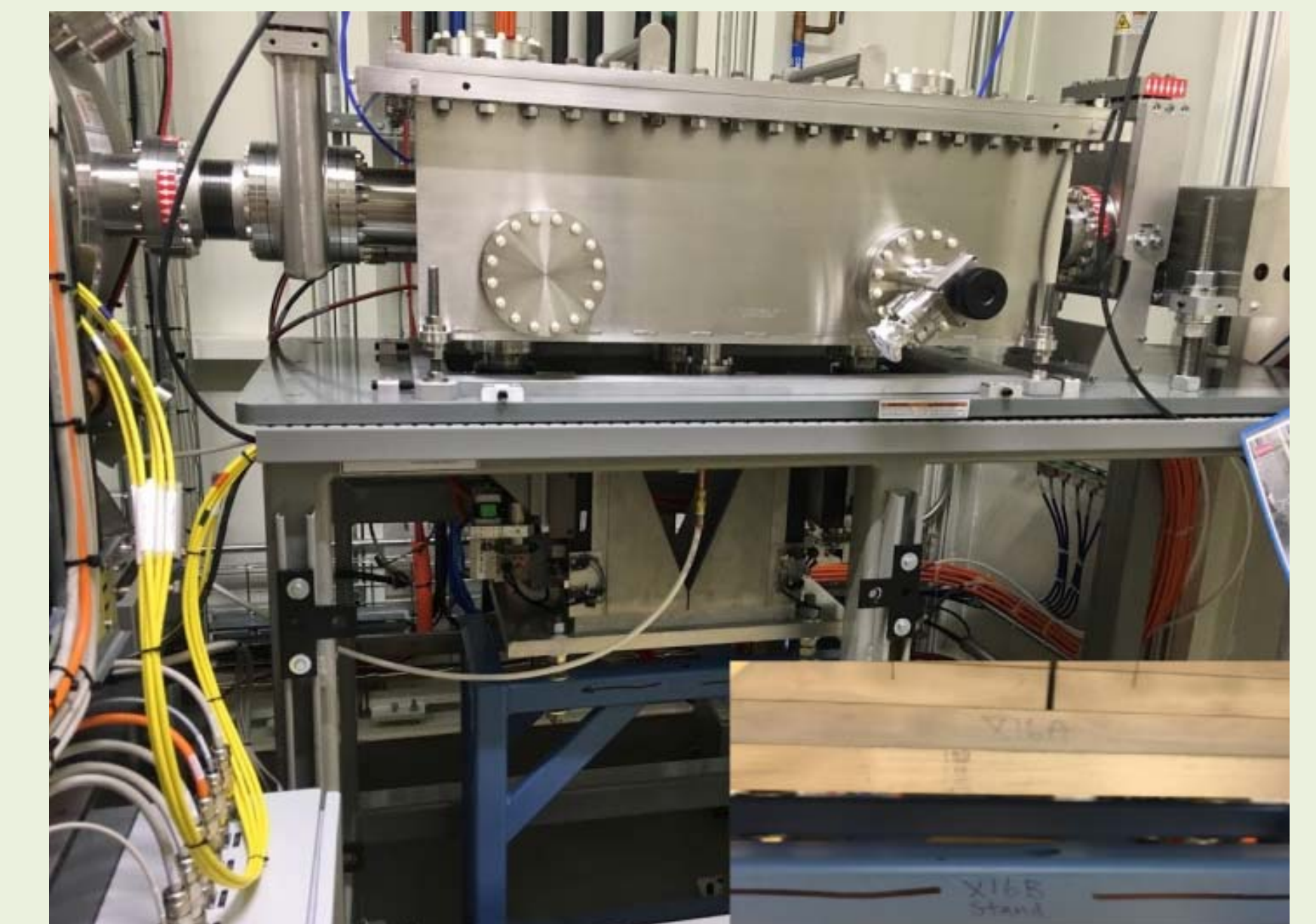
Pair Distribution Function

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Is being built now, to be completed in 2018.



QAS new controls for direct drive servomotor



XFM Vertical mirror from two identical mirrors from NSLS X16A and X16B.

CUSTOM INSTRUMENTS

BDN is the home for instruments developed by scientific non-commercial groups. CMS(11-BM), TES (8-BM) and XFM (4-BM) use KB-mirrors, designed by the Center for Advanced Radiation Sources (CARS) at the University of Chicago [3]. In-house developed electrometer by P. Siddons was used in many beam diagnostic solutions at all BDN beamlines. This design is now sold commercially [4].

CONCLUSION

Reused, rebuilt, or refurbished scientific equipment, sometimes decades old, can be successfully retrofitted with modern controls solutions and customized to fit the control system standards. This then brings the component up to current specifications and gives the design a long life and the world class performance.

REFERENCES

- [1] T. N. Stanislavchuk, et. al, *Rev. Sci. Instr.* 84, 023901 (2013). [2] A. Macdowell et. al, 1989, *Rev. Sci. Instrum.*, 60(7), p1901-1904 [3] P. J. Eng, et. al, in *Proc. SPIE's International Symposium on Optical Science, Engineering, and Instrumentation*, San Diego, CA, USA, Nov. 1998, 3449. 10.1117/12.330342. [4] D.P. Siddons et al, *Journal of Physics: Conference Series.* 499. 012001. 10.1088