



The Deep Dish Development Array: A Pathfinder for the Canadian Hydrogen Observatory and Radio transient Detector

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The Canadian Hydrogen Observatory and Radio transient Detector (CHORD) was recently named the top priority, new mid-scale ground based facility by the Canadian Astronomy Long Range Plan for the 2020 decade [1]. CHORD will build on the legacy of the Canadian Hydrogen Intensity Mapping Experiment (CHIME), providing superior capabilities for studying cosmic Hydrogen, fast radio bursts, pulsars, and more. At its core, CHORD will consist of 512 6-meter diameter composite dishes, arranged in a close-packed and highly redundant array. CHORD will have instantaneous coverage over the 300–1500 MHz band, made possible by ultra-wideband feeds, ultra-low-noise amplifiers, and a powerful digital backend producing both formed beams and full visibilities in real time. CHORD will drive innovation in several areas of radio-frequency technology needed for the future generation of radio interferometers such as the Square Kilometer Array.

To aid in the development of these new technologies, we have built the Deep Dish Development Array (D3A) at the Dominion Radio Astrophysical Observatory near Penticton, British Columbia. D3A began in 2019 with two 3-meter diameter dishes, which were used to validate the composite dish manufacturing process and demonstrate that the required material performance could be achieved. Since that time, D3A has expanded to include 6-meter diameter CHORD-style dishes, as well as prototypes of the mounts, radomes, feeds, and analog electronics. D3A permits end-to-end testing of these technologies in the field, serving to validate simulations and laboratory measurements. Here we will present the current status of D3A, as well as a summary of key findings related to instrument performance.

References

- [1] Canadian Astronomical Society. 2021. *Discovery at the Cosmic Frontier: Canadian Astronomy Long Range Plan 2020-2030*. ISBN 978-0-9878010-4-3