The Green Bank North Celestial Cap Pulsar Survey
A Decade of Discovery


Publication date
2021

Document Version
Final published version

Published in
Bulletin - American Astronomical Society

License
CC BY

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
The Green Bank North Celestial Cap Pulsar Survey: A Decade of Discovery

R. Lynch¹, G. Agazie², H. Blumer³, P. Chawla⁴, M. DeCesar⁵, W. Fiore³, E. Fonseca⁴, J. Hessels⁶, D. Kaplan², V. Kaspi⁴, V. Kondratiev⁶, M. LaRose³, L. Levin⁷, E. Lewis³, A. McEwen², M. McLaughlin³, M. Mingyar³, H. Al Noori⁸, E. Parent⁴, S. Ransom⁹, M. Roberts¹⁰, A. Schmiedekamp¹¹, X. Siemens¹², R. Spiewak¹³, I. Stairs¹⁴, M. Surnis⁷, J. Swiggum⁵, J. van Leeuwen⁶,

Green Bank North Celestial Cap Pulsar Survey Collaboration¹

¹Green Bank Observatory, Green Bank, WV, ²University of Wisconsin Milwaukee, Milwaukee, WI, ³West Virginia University, Morgantown, WV, ⁴McGill University, Montreal, QC, Canada, ⁵Lafayette College, Easton, PA, ⁶ASTRON, the Netherlands Institute for Radio Astronomy, Dwingeloo, Netherlands, ⁷University of Manchester, Manchester, United Kingdom, ⁸University of California Santa Barbara, Santa Barbara, CA, ⁹National Radio Astronomy Observatory, Charlottesville, VA, ¹⁰New York University, Abu Dhabi, United Arab Emirates, ¹¹Penn State University, Abington, PA, ¹²Oregon State University, Corvallis, OR, ¹³Swinburne University, Hawthorn, Australia, ¹⁴University of British Columbia, Vancouver, BC, Canada

Published on: Jan 11, 2021
License: Creative Commons Attribution 4.0 International License (CC-BY 4.0)
The Green Bank North Celestial Cap (GBNCC) pulsar survey is the most successful low-frequency pulsar survey ever carried out. Using the Robert C. Byrd Green Bank Telescope (GBT) to cover 85% of the celestial sphere at a center frequency of 350 MHz, the survey is optimized for finding bright, nearby pulsars, particularly millisecond pulsars (MSPs) in short-orbital period binary systems. Data-taking, which began in 2009, is 95% complete, and we expect to finish the survey in 2021. Here, we provide a broad overview and update of the GBNCC survey, with a focus on recent results. To-date, GBNCC has discovered 190 pulsars, of which 33 are MSPs. Ten MSPs have been included in the North American Nanohertz Observatory for Gravitational Waves with the goal of directly detecting low-frequency gravitational waves. Improvements in our single-pulse detection pipeline have also resulted in the discovery of the first fast radio burst in the survey. In partnership with the Canadian HI Intensity Mapping Experiment (CHIME), we are observing select GBNCC pulsars with an increased cadence, which is greatly accelerating our ability to derive timing solutions. The increased cadence has also allowed us to measure three post-Keplerian parameters in a highly relativistic double neutron star system, providing a test of general relativity that will steadily improve in precision with time. We expect that approximately 50 additional long-period pulsars and 3-8 MSPs will be discovered in the remaining survey regions. A full re-processing of the data using improved interference excision and candidate selection is planned, which may result in additional discoveries.