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An improved semi-coherent follow-up method for FrequencyHough all-sky candidates

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In the all-sky search for continuous gravitational waves emitted by spinning neutron stars, the most significant candidates are selected and subject to a follow-up step. The follow-up allows to strongly increase the detection confidence for real gravitational wave signals and to reject candidates of non-gravitational origin. The computational cost of the follow-up is an important issue as it affects the number of candidates which can be taken into account, with an impact on the search sensitivity. We present an improved semi-coherent method to perform the follow-up of candidates selected by the FrequencyHough pipeline, based on the recently developed concept of Band Sample Data collection. This new method allows to gain at least 2 orders of magnitude in computing cost, thanks to the possibility to run the barycentric corrections in a computationally cheap way and to an optimised incoherent step. At fixed computing cost this implies the possibility to perform a number of follow-ups much larger than before and to significantly increase the coherence time of the follow-up for the most interesting candidates.

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