

Title: Sensitive Detection of Coherence

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In SETI, we often detect drifting and nondrifting coherent signals. Generally, unless we have prior information about a signal requiring confirmation, we use integration of power spectra. The channels of the spectrum are wide enough to guarantee that signals will remain in a spectral channel during integration.

New methods are now being developed to find pure signals in a more coherent, narrowband, fashion. First, if enough drifts can be analyzed, narrowing spectral channels, making them longer in time, can enhance sensitivity by as much as a factor of two. Second, multiplication of spectra can yield, using modified incoherent techniques, approximately this same gain in sensitivity, with about a doubling in computing cost. Third, one can do a matched filter analysis to search for constantly drifting signals as opposed to randomly unstable sinusoids.

As signals become more complex and less coherent in our own environment, we consider strongly the possibility that advanced alien signals may have this same property. The remaining coherent part of transmissions, clock signals, for example, may be the most detectable alien artifacts. Formulas for the new coherent detectors are presented.