

44th SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The
Next Steps (A4)
SETI 1: SETI Science and Technology (1)

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PULSAR CLOCKS AS A TIMESTAMPS FOR ACTIVE SETI MESSAGES

Abstract

Active SETI involves transmitting intentional, information-rich signals to other stars with the intent of eliciting a response from extraterrestrial intelligence (ETI). On purely statistical terms, any ETI we are likely to make contact with through interstellar communication are likely to have had the technology that is a prerequisite for interstellar communication much longer than we have. In this early stage of terrestrial Active SETI, it is not economically feasible to transmit continuously to a large number of stars over the course of centuries or millennia. However, if there are ETI conducting continuous, all-sky surveys of the sort that humankind is capable even at our current level of technology, only intermittent messages from Earth are needed. We propose transmitting powerful signals to nearby stars, in which message contents include an indication of the time the message was transmitted from Earth, as well as the time we hope future humans will be listening for a reply. Specifically, we would indicate an intent to listen for a reply at several specified points after the time needed for a round-trip exchange, taking into account the distance between Earth and the target star. To meet the requirement of current terrestrial Passive SETI projects that any credible extraterrestrial signal needs to repeat, we propose repeated transmissions immediately after the initial transmission, as well as months and years later. Drawing on the precedent established by NASA's Pioneer plaque, we propose indicating time by reference to pulsars visible to both Earth and the target star. As confirmation that the pulsars included refer to astronomical objects, their location in three-dimensional space relative to Earth and the target star will be indicated. Repeated transmissions separated by months or years would show the lapse of time through this "pulsar clock." This use of a pulsar timestamp to synchronize timing of a reply from ETI and listening by future terrestrial SETI programs addresses one of the key objections raised thus far against Active SETI: that humankind does not have the resources to mount a meaningful Active SETI project that is sustainable on multigenerational timescales. By requiring only intermittent signals from Earth, no resource-intensive continuous transmissions are needed.