V224b   SuMIRe-PFS[27]: Optimal tiling algorithm for the PFS open-use programs

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Subaru Prime Focus Spectrograph (PFS) is a fiber-fed multiplex system, which enables acquisition of around 2400 spectra of objects simultaneously over a wide hexagonal field of 1.38 deg on the sky. Its innovative features are expected to help make great improvements in various science fields. In order to efficiently utilize all the fibers, we would like to share fibers among multiple open-use programs in each single exposure. However, targets from different programs can vary significantly in size, required exposures, science priority, etc, making it hard to optimize tiling of pointings.

In this work, we are going to develop an "optimal" tiling algorithm for PFS open-use programs: 1) to achieve high sampling rate in high-priority samples in each semester, and 2) to maximize fiber allocation efficiency in each exposure. To determine the pointing centers, we firstly pick up peaks from kernel density estimation (KDE) of entire samples with a weighting scheme designed to balance targets by accounting for their science ranking, spatial density and required exposures. We then put pointings over those peaks, and apply network flow to assign fibers to targets. We slightly perturb all pointings to find the local minimal cost in network flow by Powell direction method. From our simulation, the preliminary results suggest 1) a sampling rate greater than 80% in rank A (highest science ranking) samples, and 2) an average fiber allocation efficiency of 59%.