Documentation for `QuickFiber` Input and Output Files

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Contents

This documents describes the format of the files generated by the `QuickFiber` software.

1 Important definitions

Taken from `https://desi.lbl.gov/trac/wiki/Pipeline/FormatsAndNumbering`

- Tile: pre-defined locations on the sky. Tiles are pre-defined with a 6-digit ID. 900000 and above are reserved for calibration, commissioning, test, ancillary, and other non-DESI key project tiles, which may not even appear in a DESI tile list.
- Pointing: A specific selection of targets within a tile indicating both a pointing of the telescope and the fiber positioners.

This means that a tile may be observed multiple times with different pointings. A pointing may be observed multiple times with different exposures. If even one target changes or any target: fiber mapping changes it becomes a new

pointing. A slightly different positioner location of the same targets on the same fibers is the same pointing.

2 `QuickFiber` inputs

The necessary input of `QuickFiber` are

- TargetDB. Data base containing the information of all targets on the sky.
- SurveyTiles. File containing the positions of all the tiles to be observed.
- FiberPositions. File containing the positions of all fibers on the focal plane.

3 `QuickFiber` inputs data-structure

TargetDB is a database with the following tables.

- brickid: [1,662174]
- objid: [0,N-1]
- brick_primary: T, F
- ra: degrees [0-360]
- dec: degrees [-90 -+90]
- objtype: ELG, LRG, QSO, SKY, STDSTAR, GAL, OTHER

SurveyTiles is a FITS file with the following fields.

- ...

FiberPositions is a FITS file with the following fields.

- ...

4 `QuickFiber` outputs

The principal outputs of `QuickFiber` are

- PotentialFiberMap. The set of targets that can be reached by a set of fibers in a tile.
- FiberMap. This is a pointing defining which targets are on which fiber.

The previous two items will be stored in the same FITS file for each tile and poiting. This means that two different assignment algorithms running on the same tile producing different pointings will store the results in different files.

5 `QuickFiber` output file naming convention

Primary output files from `QuickFiber` will follow the naming scheme

`QuickFiber_TTTTTT_PPPPPPPPPPPP.fits`

where `TTTTTT` is the 6-digit Tile ID and `PPPPPPPPPPPP` is a 12-digit pointing ID. The pointing ID is hash value computed by adding the IDs of all the targets in the pointing.

6 `QuickFiber` outputs data-structure

PotentialFiberMap contains the following information

- fiber: [0-4999]
- numtargetid: [1-] Number of potential target IDs associated to each fiber. If a fiber has zero potential targets it has the targetID `-1` associated to it.
- targetid: unique target identifier to get back to target selection info. This contains all the targets that can be reached by a fiber. This concatenates the sets of available targets for each fiber.

FiberMap contains the following information[1]

- fiber: [0-4999]
- positioner: [0-4999]
- objtype: ELG, LRG, QSO, SKY, STDSTAR, GAL, OTHER
- targetid: unique target identifier to get back to target selection info
- desi_target0: 64 bit mask of targeting info
- ra: degrees [0-360]
- dec: degrees [-90 - +90]
- xfocal_design: mm from center in positioner coordinate system
- yfocal_deisgn: mm from center in positioner coordinate system

[1] First defined in `https://desi.lbl.gov/trac/wiki/Pipeline/FormatsAndNumbering`.

6.1 Example of PotentialFiberMap construction

Let's assume for simplicity that we have 4 fibers with IDs `[0,1,2,3]`. There are in turn 4 differents sets of targets that can be reached by each fiber. These sets are `[980,203]`, `[736,102,304]`, `[234]` and `[-1]` for fibers `0,1,2` and `3`, respectiveley. The index `-1` for fiber `3` means that this fiber cannot reach any target.

In this case PotentialFiberMap has the following fields

- fiber: contains the array `[0,1,2,3]`.
- numtargetid: contains the array `[2,3,1,1]`.
- targetid: contains the array `[980,203,736,102,304,234,-1]`.