Fraction Groups

Defining *Fraction Groups* is the first step in the PBS Optimization process within Astroid. Most commonly, a fraction group is simply an arrangement of beams that will be used in a typical daily treatment fraction. The Fraction Group contains some basic group information, as well as Fraction Group level constraints and collections of *Beam Sets*, referred to as *Beam Set Groups*. The *Beam Set* and *Beam Set Group* are key concepts within Astroid that allow for high levels of control over the Astroid PBS Optimization engine. Further details of these critical items are provided below and additionally, examples of some common cases and how fraction groups, beam set groups, and beam sets can be constructed to meet the clinical needs of various clinical cases can be found 

here.

General Fraction Group Data

- **Color**: Display color of the *Fraction Group*
- **Description**: Optional, user specified text describing the *Fraction Group*
- **Fraction Count**: The total number of fractions to be delivered for this *Fraction Group*; this is very important as it will determine the appropriate Monitor Units for the individual beams

Fraction Group Constraints

Describe the FG Level Constraints here 

Beam Set Groups

Simply speaking, a *Beam Set Group* is just a collection of *Beam Sets* that together will provide a specified dose to a particular target, so that in clinical practice each *Beam Set Group* is most commonly associated with a single target structure (i.e. there will be one *Beam Set Group* per target). Most standard single lesion treatments will therefore use only one *Beam Set Group*. More complex prescriptions, such as Simultaneous Integrated Boosts (SIB), are typically split into two groups, one for the primary target and a second for the boost target. Within the *Beam Set Group*, a target is specified along with one or more *Beam Sets* and any beam set level constraints necessary to meet the clinical goals for this target. The *Beam Sets* are the lowest level unit for the Astroid PBS Optimizer and proper arrangement of the beams within these sets allows for both Single Field Optimized (SFO) and Intensity Modulated Proton Therapy (IMPT) fields to be included within the same fraction.

Beam Sets

Discuss beam set groups here...

SFO Beams

Fix Me! I think it might be worth mentioning the difference between making an SFO and IMPT beam in the fraction group (e.g., when a beam is in it's own beamset in the FG, it's SFO. When with other beams in the same beamset, all the beams in the beamset are optimized together). -Daniel

IMPT Beams

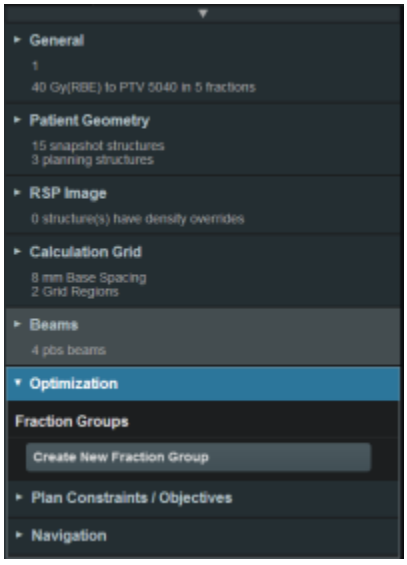
Fix Me! See above -Daniel

Beam Set Level Constraints

Fix Me! Mention the difference for constraints at the FG level and at the beamset group level. Constraints at the FG level apply to all beams at a whole, where the constraints at the beamset level have their dose values divided by how many beams are in the beam set (Kevin can explain this very well). - Daniel

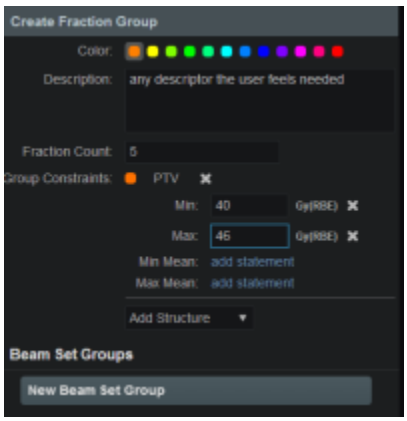
Working with Fraction Groups

1. Select the Create New Fraction Group button



2. In the newly opened block the planner will:

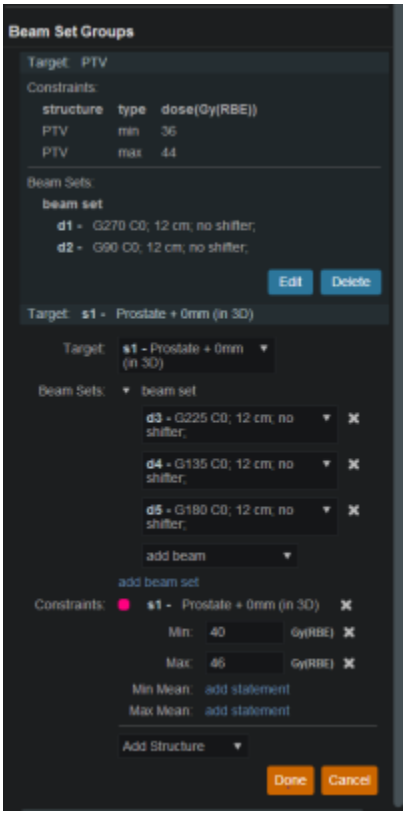
- choose the color the fraction will be denoted in
- type in any descriptor that may be needed
- enter the total number of fractions to be treated
- enter the group constraints
  - group constraints encompass the whole fraction group



  - there can be more than one target entered at this stage

3. Select New Beam Set Group
   - select the target and create a beam set that will be associated to that that target
   - there may be multiple beam sets associated to a target
   - the constraints chosen at this point will just be associated to the particular beam set

   - the user may also have multiple beam set groups associated with multiple targets within a plan



- the user needs to set the constraints for each beam set group. These constraints only apply to the associated beam set group