More Advanced HSpot Topics

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Concatenation

- **What is concatenation?**
  - **It is a way of ensuring that two observations get taken together in a defined series and without interruption.**
- **Why is it useful?**
  - **You avoid having to slew the telescope to another target and then, later, slew it back.**
    - ✓ **More efficient**
    - ✓ **Saves overheads (up to 180/600s per observation)**
  - **You ensure that both observations are made together (or neither is made!)**
    - ✓ **Valuable if you want to measure in all three PACS bands**
    - ✓ **Valuable if you want two or more lines of a variable source at the same epoch**
    - ✓ **Valuable if you want a continuum and a line measurement**

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Concatenation

- **Limitations?**
  - **Each observation must use the same instrument and sub-instrument**
    - **You cannot:**
      - **concatenate PACS and SPIRE, or SPIRE and HIFI.**
      - **cannot concatenate photometry and spectroscopy**
      - **cannot concatenate different HIFI mixer bands**
    - **You can, for example:**
      - **Concatenate PACS line and range spectroscopy**
      - **HIFI observations with different Local Oscillator Frequency**
  - **A special case**
    - **You can concatenate various different targets (e.g. a cluster of galaxies, sources in a molecular cloud)**
      - **All targets must be within a 1 degree radius of your starting point**
      - **The slew overhead IS applied**
      - **Useful if you have several targets in the same region that you want to observe with the same HIFI mixer band and LO Frequency.**

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Follow-Up

- **What is Follow-Up?**
  - **It is a way of defining that two or more observations get taken at a specific interval in time.**
- **Why is it useful?**
  - **You can ask Herschel to look at a target several times during the mission at particular times or ranges of time.**
    - ✓ **For monitoring variable objects**
    - ✓ **For checking your calibration**
  - **You can request as many follow-ups as you wish**
    - ✓ **The intervals can be fixed or variable**
    - ✓ **You can define that the observation be made within a wide or narrow window of time.**
    - ✓ **You can repeat chains of observations, if required.**

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Follow-Up

- **Limitations?**
  - **Imposes strong constraints on Mission Planning.**
  - **Obliges a particular instrument to be available on set days.**
  - **Obliges all other observations to be fitted-in around the follow-up.**
    - **Penalisation:**
      - **A 600s slew overhead is applied to observations to compensate**
      - **The same penalty is applied whether your Follow-Up falls in a window of 1 hour or of 1 month.**
    - **But:**
      - **If you have concatenated observations in a Follow-Up, only the first observation in each chain is penalised.**
  - **The wider your window for the date(s) of the Follow-Up(s), the easier it is for Mission Planning to cope and for your observations to be scheduled.**
    - **Constrain your observations too tightly and they may never be schedulable.**

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Fixed-Time Observations

- **What is a Fixed-Time Observation?**
  - **It is an observation that must be carried out at a fixed moment in time.**
    - **"Fixed" really means "fixed" – it will normally be carried out to within 1 second of the requested time.**
    - **It blocks off a space in Observation Planning that cannot be moved at all, even by a few seconds, to fit in with other observations.**
- **Why is it useful?**
  - **It can be requested to study an event that will start at a particular known time.**
  - **It could be used, for example, to observe a close-approach comet or asteroid at the moment of closest approach, or of the opening of a Visibility Window.**

☒ It is not easy to think of many scientific cases where it is definitely required over a less constraining timing option.

☑ Better to define a timing window to allow greater flexibility.

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ToO Observations

- **What is a ToO Observation?**
  - **It is an observation of an unpredictable object. For example:**
    - **"I want to observe the first supernova that appears that is brighter than V=13".**
    - **"I want to observe any bright comet that may appear".**
    - **"I want to observe the first blazar that gets brighter than V=13 in outburst".**
  - **You know exactly <u>what</u> you want to do, but <u>not when</u> you want to do it, nor <u>what source</u> you want to observe.**
- **How to enter a ToO in HSpot**
  - **Define what you want to do in as much detail as possible**
  - **Define the trigger criteria**
  - **Calculate how much time you require for "x" triggers**
  - **Enter one or more dummy AORs in HSpot**

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ToO Observations

- **What will the reaction time be?**
  - **It can never be less than 2 days because we upload 2 days of observations to Herschel and then top-up each day.**
  - **The typical reaction time will be 3-5 days for urgent ToOs (typically supernovae)**
    - **If you trigger a ToO at 8pm on a Friday evening, it is unlikely to be handled until Monday morning, so 5 days is more likely.**
    - **A ToO triggered on a normal working day could be observed in 3 days.**
  - **ToOs put a lot of stress on mission planning.**
    - **A very strong justification will be required for rapid response.**
  - **Many generic ToOs can be observed 1-2 weeks after being triggered.**
    - ✓ **Much easier to cope with in Mission Planning**
    - ✓ **More likely to be observed**
    - ✓ **Not such a strong justification is required.**

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