SUBJECT: **SPIRE Science Demonstration Observations**

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1. Introduction

1.1 Scope

This document outlines the observations required to scientifically validate the SPIRE instrument Astronomical Observing Templates (AOT) and the Key capabilities to be demonstrated during the Science Demonstration (SD) phase of the mission. This is an initial skeleton version, which will be extended as the detailed plans for SD phase are defiend in detail.

1.2 Structure of Document

The structure of this document lists the scientific modes to be demonstrated and validated and the possible observations required to meet this criteria.

1.3 Applicable Documents

1.4 Reference Documents

1.5 List of Acronyms

AOT	Astronomical Observing Template
POF	Photometer Observatory Function
SOF	Spectrometer Observatory Function

1.6 List of Symbols

Symbol	Definition

2. Plans for Science Demonstration Phase

Science Demonstration (SD) Phase is schedule to take place immediately after PV phase, and will last up to 2.5 months. The objectives, as defined by the ESA Project Scientist, are:

- to demonstrate to (potential) observers in the astronomical community what the actual scientific capabilities of the observatory are;
- thus to demonstrate what Herschel can do, and also state what it cannot;
- to learn what we can learn about the universe from observations performed successfully from a technical point of view;
- thus to demonstrate that identified science objectives can be addressed with the actual performance of the observatory;
- to produce 'pretty pictures' for communications purposes.

3. SPIRE observing modes to be demonstrated and validated

3.1 Photometer

- Scan-map (POF5)
- Jiggle-map (POF3)
- Point Source (POF2)
- Parallel Mode (POF9)

3.2 Spectrometer

- Point Source (SOF1)
- Mapping (SOF2)

4. Observations

4.1 Photometer Observations

- Scan-map + Jiggle-map
  - Deep integration of smallish area (about 30 x 30 arcmin)
  - With cross-linking and many repeats
  - Well-understood extragalactic field
  - Check ability to extract point sources and extended structure
  - Check that pointing performance is not affecting data quality
  - Establish confusion limit ^ influences strategy for surveys
- Large area shallow map
  - More than 4 x 4 degrees
  - Check mosaicing
  - Check impact of 1/f on structure extraction
- Map of a resolved galaxy/star formation region/etc.
  - Jiggle-map and scan-map comparison ^ influence reoptimisation
  - Image for PR
  - Check of image dynamic range
- Map a moving SS object
  - A suitable comet
- Point source
  - Deep points source integrations
  - Check instrument and confusion noise characteristics
- Parallel mode

  - Compare scan rates
  - Check for systematic effects caused by inter-instrument interference
  - Comparison:
    - Does SPIRE alone + PACS alone give better value for mg. than parallel mode
    - Need answer to this for shallow extragalactic surveys and HiGal type programmes
- Some source types
  - Antennae
  - A resolved comet
  - Planetary nebula
  - Resolved nearby galaxies (edge-on; face-on)
  - A circumstellar dust shell
  - A debris disk
  - A SF region (e.g., Eagle; Horsehead . . .)
  - Extragalactic deep field

4.2 Spectrometer Observations

- Point source
  - Line Spectroscopy (high resolution mode)
    - Planetary nebula: NGC 7027 (lots of lines; low continuum)
    - AGB star IRC10216 (high continuum with many lines)
    - Some galaxies (e.g., Fischer et al sources or Paul van der Werf sources)
    - Planets
  - Spectrophotometry (low resolution mode)
    - Asteroids + TNOs
    - Stars
    - Titan
    - Comet
    - A few galaxies (different redshifts)
- Maps
  - Big nearby galaxies
  - Shocked regions
  - Outflows
  - Diffuse ISM
  - Typical Class-0

5. Plans for data processing and analysis

TBW

6. Cordination with PACS

TBW