TRL discussion

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TRL definition (ESA)

TRL	Definition	Clearer explanation
1	Basic principles observed and reported	Interesting idea
2	Technology concept and/or application formulated	Theoretical concept
3	Analytical & experimental critical function and/or characteristic proof-of-concept	Modelling
4	Component and/or breadboard validation in laboratory environment	Lab test on prototype
5	Component and/or breadboard validation in relevant environment	System use in laboratory
6	System/subsystem model or prototype demonstration in a relevant environment (ground or space)	Use in Ground based project for scientific observations
7	System prototype demonstration in a space environment	Prototype in space conditions (lab test) Balloon borne ?
8	Actual system completed and "Flight qualified" through test and demonstration (ground or space)	System in space qualified environment
9	Actual system "Flight proven" through successful mission operations	Use in space mission

Detectors

Type	TRL	Comment
TES	6/7	+ Balloon flight, development with ESA. - Susceptibility to Cosmic ray hits?
CEB	4/5	+ No/low Susceptibility to Cosmic ray hits + High dynamic range
KIDs	6	Unknown: xtalk, CR hits, Low frequency(<100GHz) coverage?
Multimode	9	A la planck Polarisation and beam knowledge issues

Antennas

Type	TRL	Comment
Horns	9	+ Well known and well behaved - Aperture efficiency, mass, dimensions
lenslet coupled detectors + planar antenna	5/6	+ compact, integration in large arrays Broadband? -RF Performances for CMB? Rq: works only single mode
planar antennas	5/6	+ integration in large focal planes, low mass and low dimensions, manufacture -RF Performances for CMB? Rq: works only single mode

Filtering

Type	TRL	Comment
Quasi-Optical	9	- Size, xtalk, muti-freq FPU Homogeneity ?
Planar	5/6	Great in theory Reproducibility?

Spectroscopy

Type	TRL	Comment
FTS	9	What kind of detectors shall we have? Beams?
SWIFT	3	+ compact - Coupling efficiency
TRP+FTS	4	Detection scheme?
A la SuperSpec	4	+ compact -Coupling efficiency Filtering homogeneity?

Polarisation modulator

Common concern: size

Type	TRL	Comment
Refractive Mesh HWP	4/5	+ Use same technology than embedded filter (TRL9) - Thermalisation, rotation mechanism
Reflective Mesh HWP	3	+ Use same technology than embedded filter (TRL9)
TRP	3/4	

Mechanisms

Type	TRL	Comment
Translation	9	
Rotation (shaft)	?	
Large rotation with bearings	?	

Cryogenics

Type	TRL	Comment
Dilution a la Planck	9	Where will we find the 3He ? Limited lifetime
Closed cycle dilution	4	
ADR	9	Operation with detectors ?