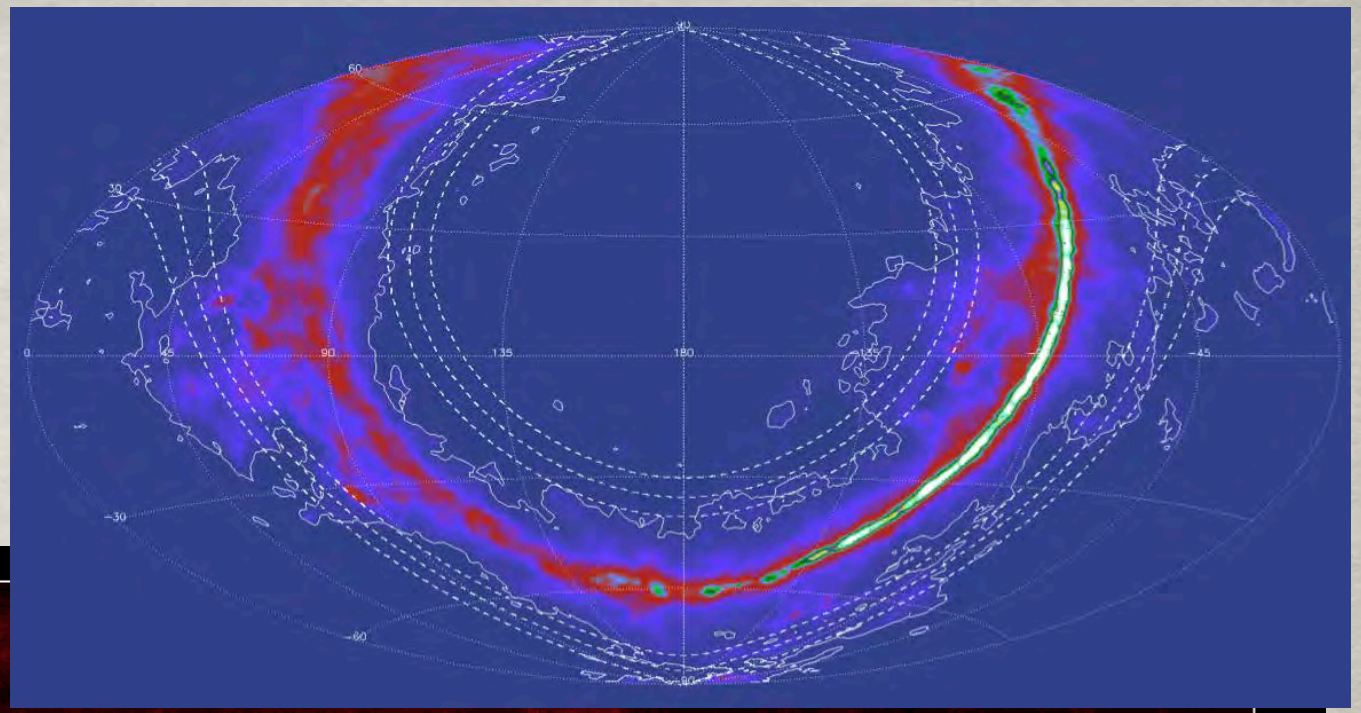
Dust in our galaxy causes extinction

Avoid dense star regions close to the plane (for main survey: might have MW additional); need some for VIS calibs



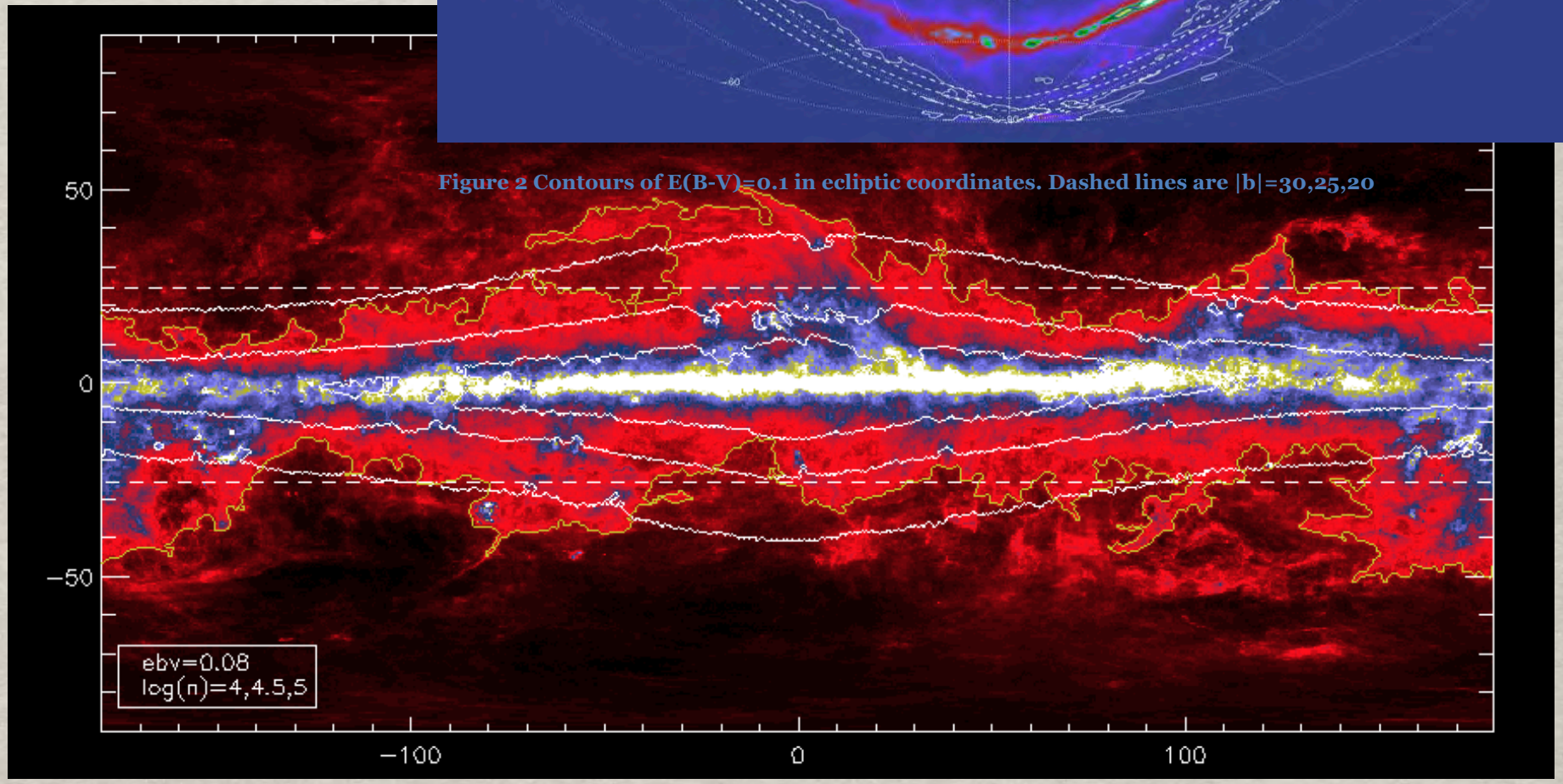


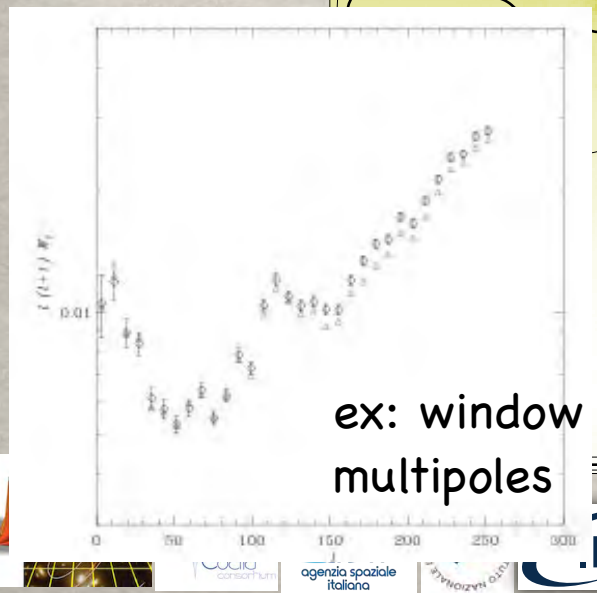
Figure 2 Contours of E(B-V)=0.1 in ecliptic coordinates. Dashed lines are |b|=30,25,20

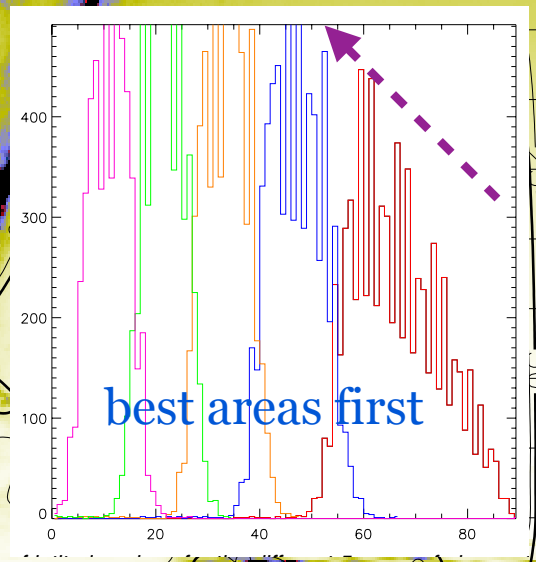
Extinction maps (Schlegel et al) + Gaia model 10 (DPAC, Luri et alnumber density isocontours G<20)

Galaxy density for WL: want the overall average > 30 /sq arc min

extinction & stars

max zodiacal backgr



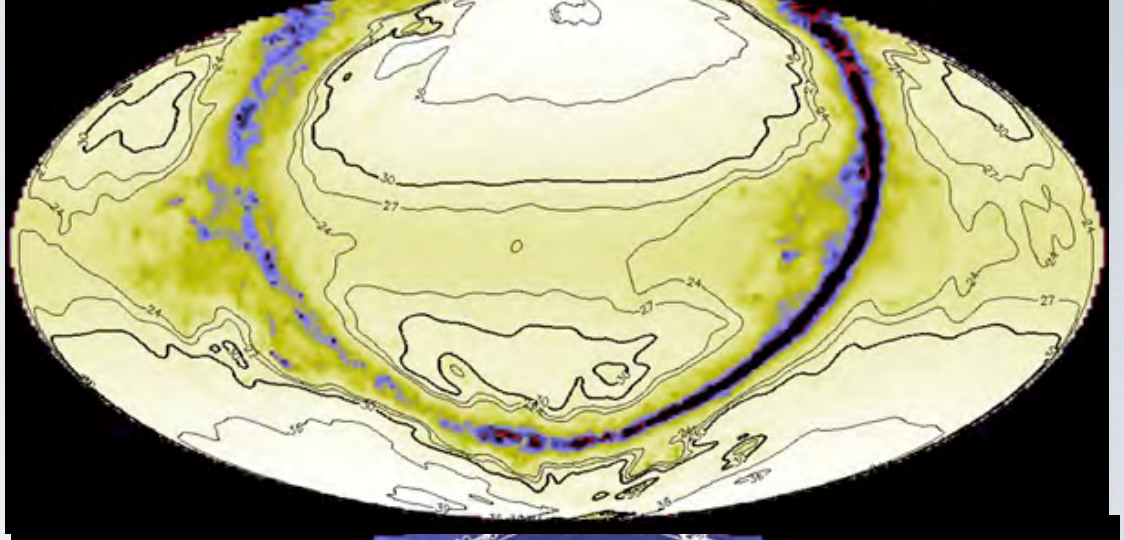


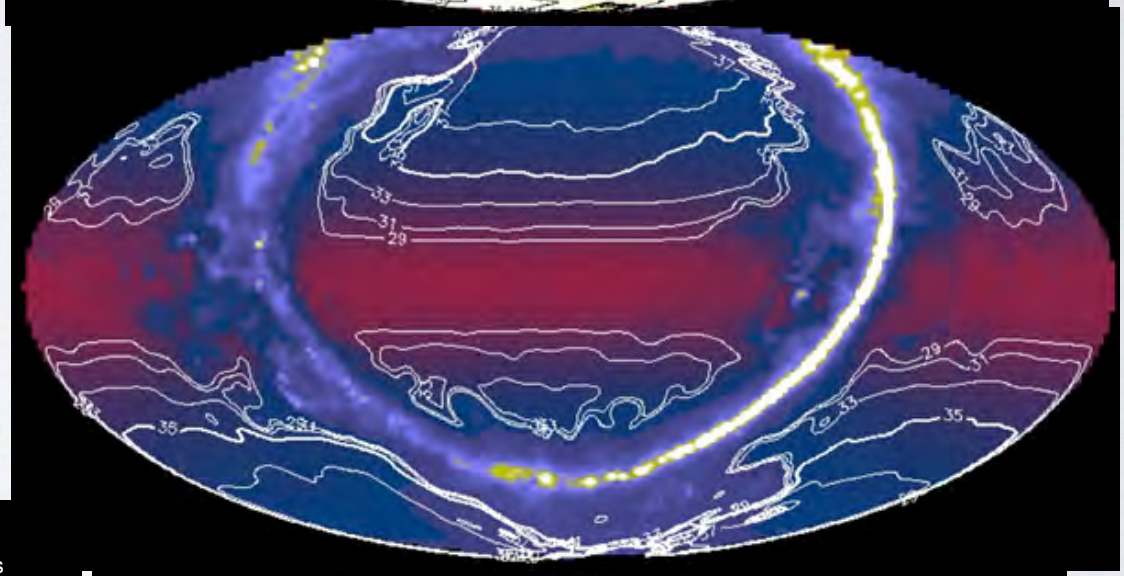
Euclid Survey Areas,
(~2012)

N~1.5-2 10^9 Weak Lensing sampling

N~5-6 10^7 Being revised ditto for Clustering

R.S & J. Amiaux (ESAC tool)





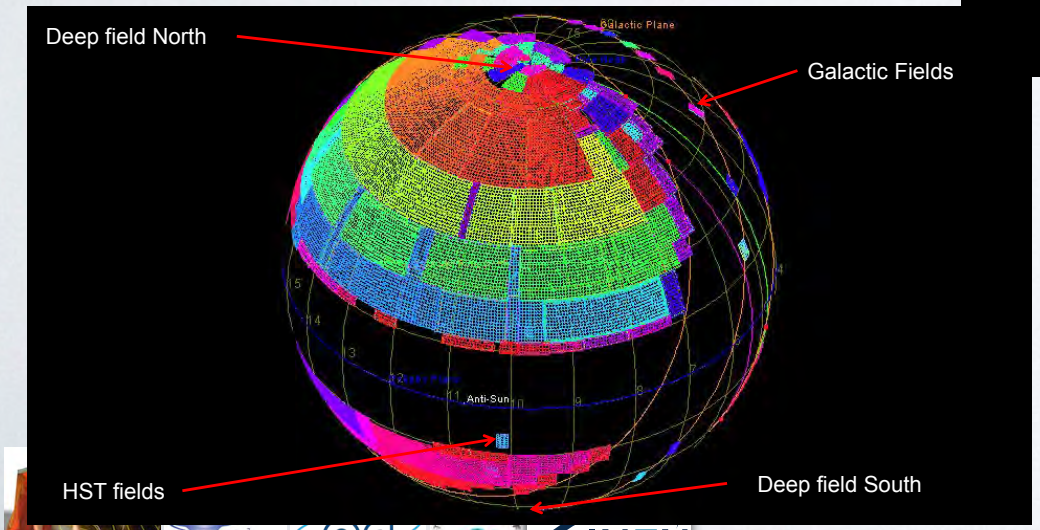


Figure 3.11.4-2: Assumption and locations of main calibrations for building the reference survey and implementation of the fields on the reference survey.

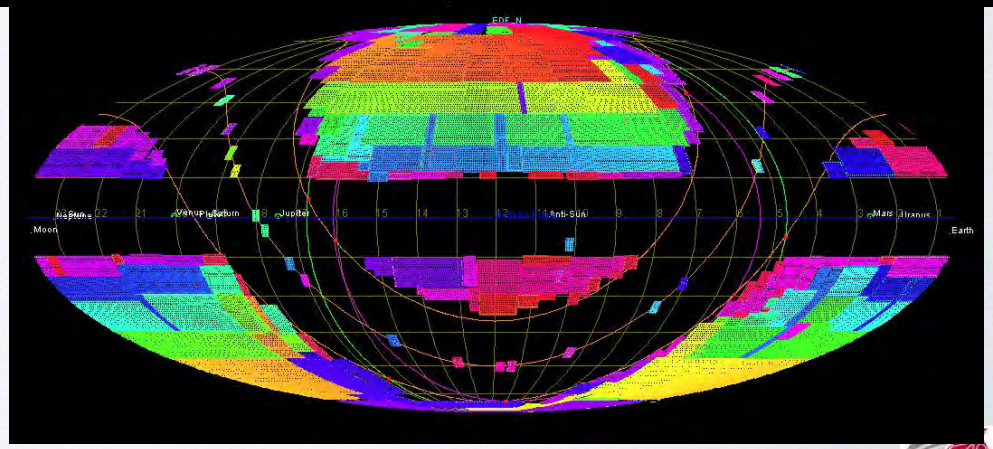
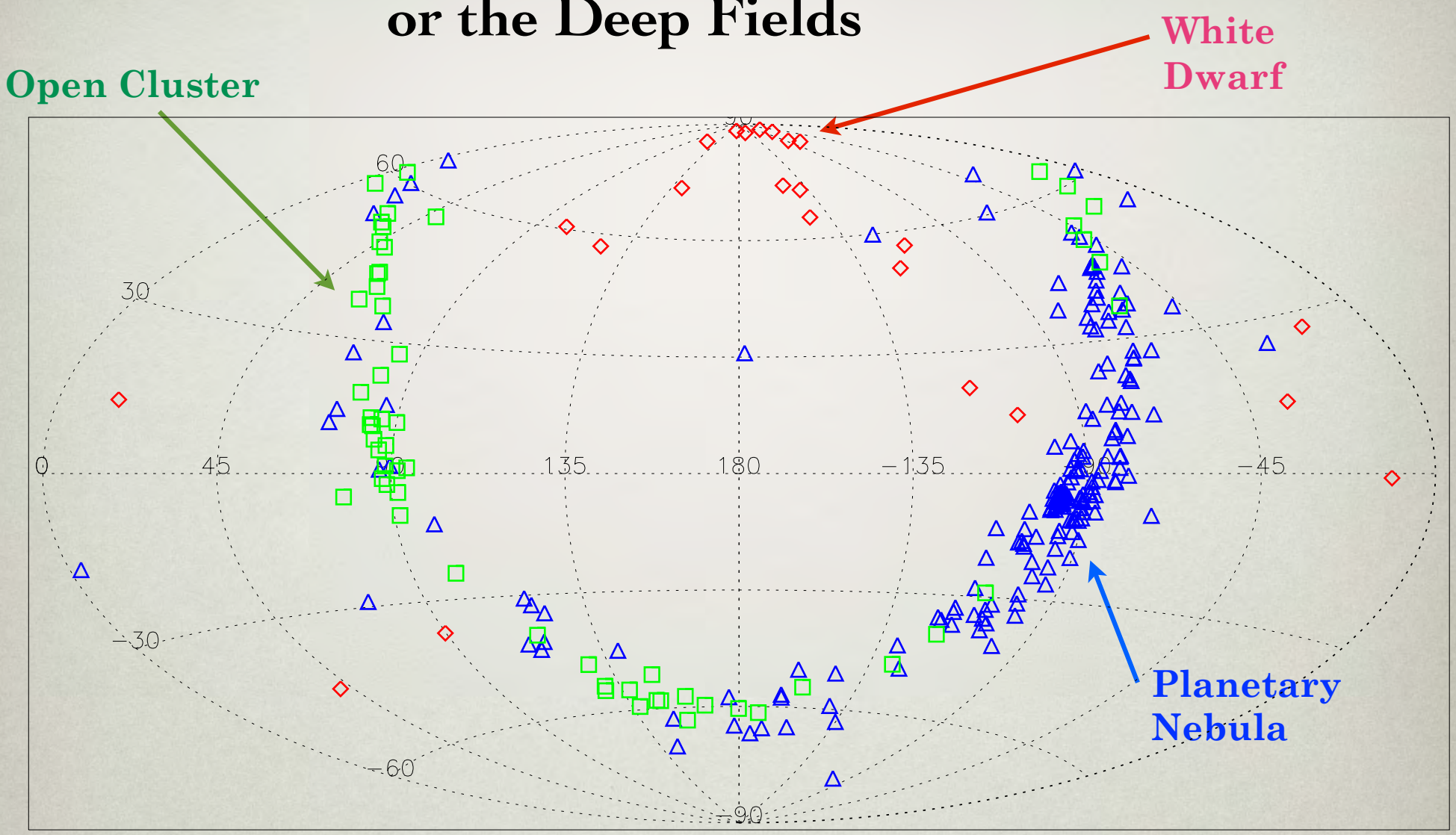


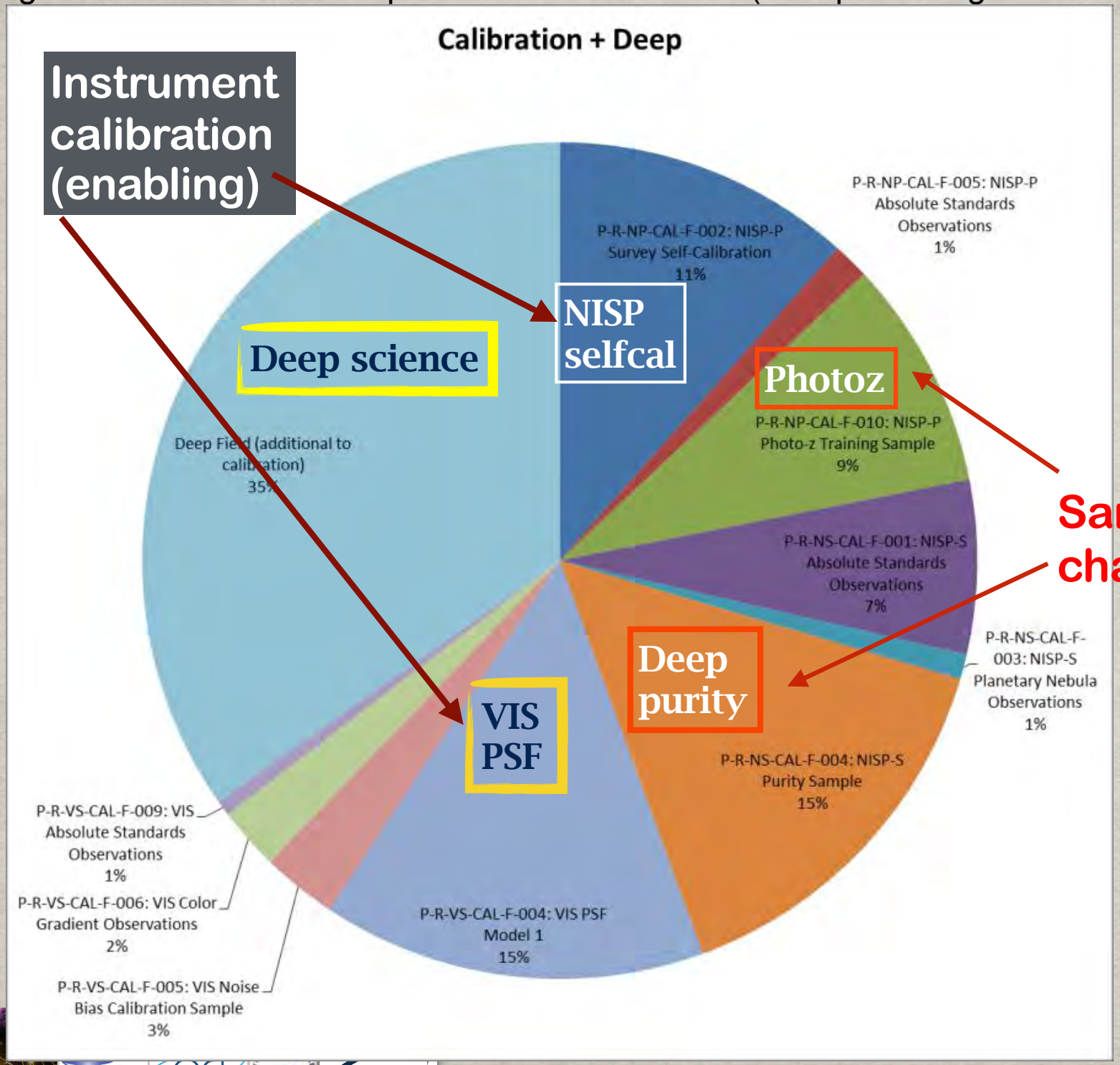
Figure 3.11.4-3: Mollweide representation of the full reference survey (including location of calibration fields).

For calibrations use specific targets or the Deep Fields



NISP calibrators above, for WL need dense star regions (in the galaxy plane)

ow gives the different time spent on the calibrations (as a percentage of the to



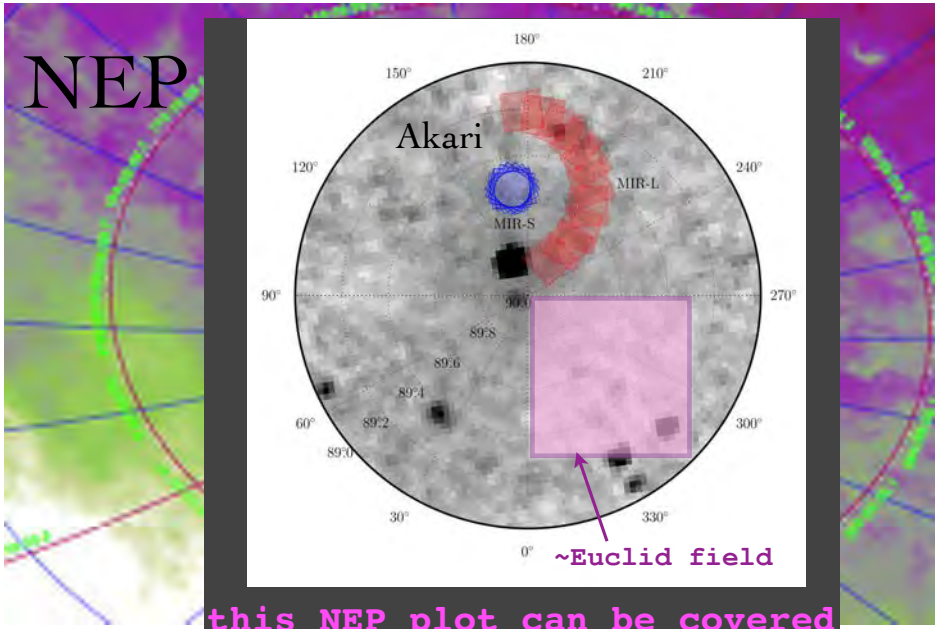
~ 1 year of observing time

Table 4-4-62: Calibration + Deep expected durations (percentage of calibration total duration)

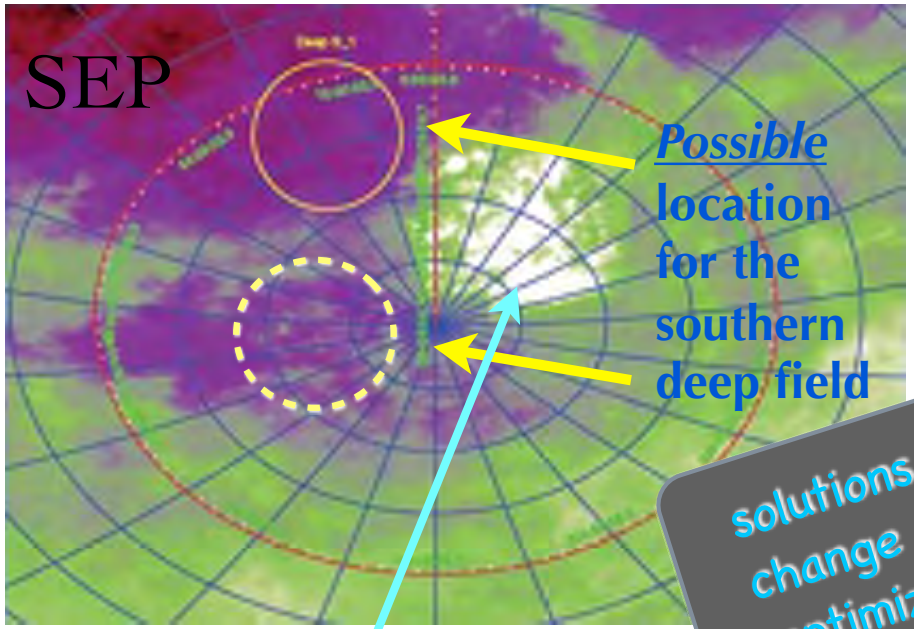
Deep Field(s): calibration reqs (*being updated*) + science

Need high ecliptic latitude for observability (want low extinction too)

main requirements:
2x20 sq deg
2 mags deeper than wide



this NEP plot can be covered by 3x3 Euclid fields



solutions will change after optimization

Figure 5.6: Left panel: Northern Deep Field projected on a sky extinction map. Right panel: Southe[illegible] Field

Part of the SEP is covered by the Large Magellanic cloud ... not good for deep xgal field so need to move sideways (shorter visibility)

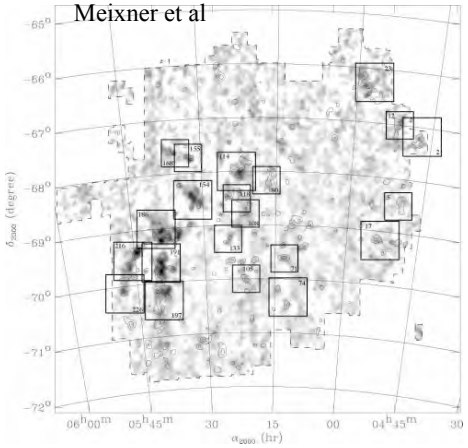
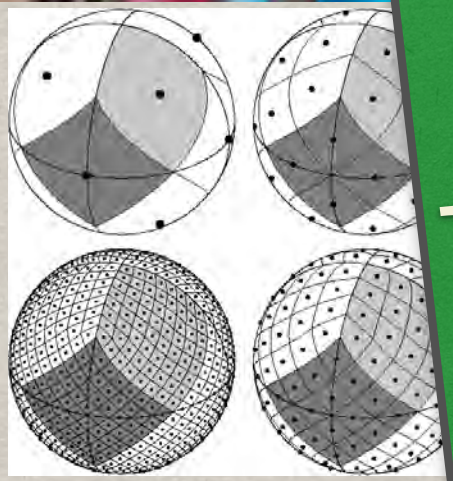


Fig 5: Extinction map of the LMC obtained from star count in the 2-mass catalog overlaid with CO contours. Av ranges from 0 to 5 mag

To tile or not to tile.....

Pantheon

Tiles!!

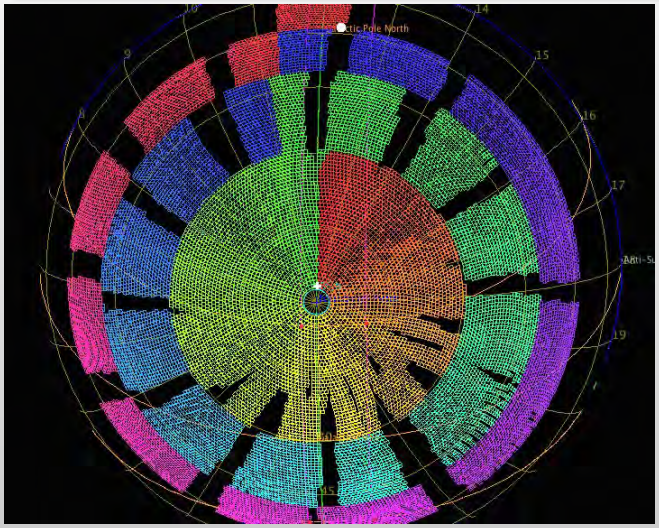


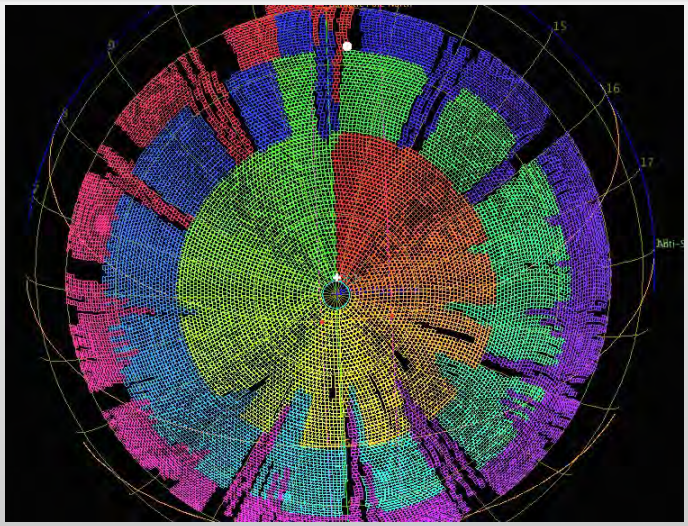
Healpix, (Gorski et

introducing

ECTile !! ©

The visual/manual approach must be superseded by optimization algorithms which take into account various quantities and boundaries





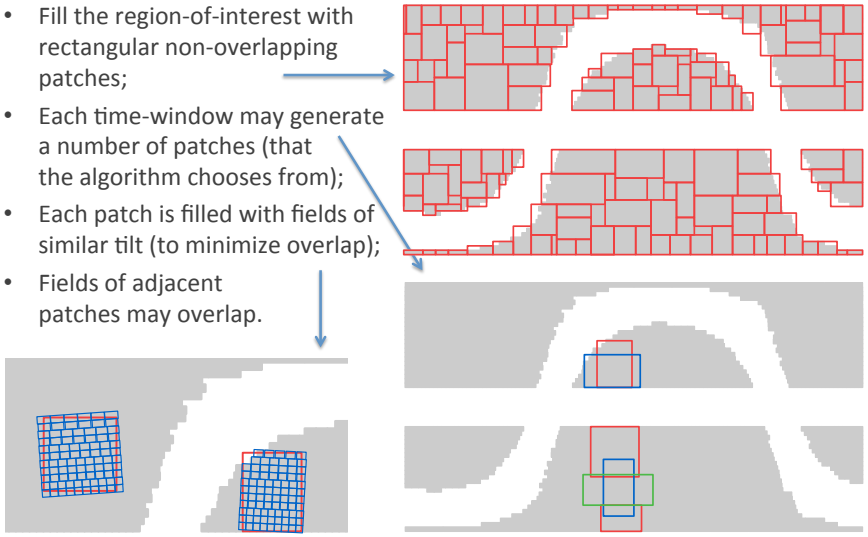
S. Carvalho (predefined tiling: minimise overlaps but needs some range in alpha)

Try to fill regions left empty because of observing calibrations (large slews….)

Automatic Computation of EUCLID Survey by simulated annealing

Strategy of the algorithm

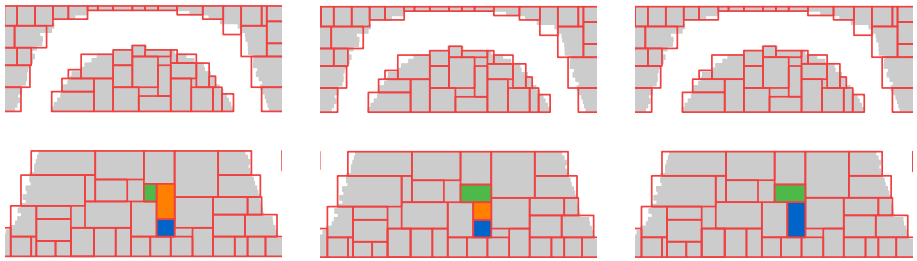
- Fill the region-of-interest with rectangular non-overlapping patches;
- Each time-window may generate a number of patches (that the algorithm chooses from);
- Each patch is filled with fields of similar tilt (to minimize overlap);
- Fields of adjacent patches may overlap.



Automatic Computation of EUCLID Survey by simulated annealing

Example of iterative step

controlled exploration of the space of configurations



1
- Current tessellation (with three patches highlighted)

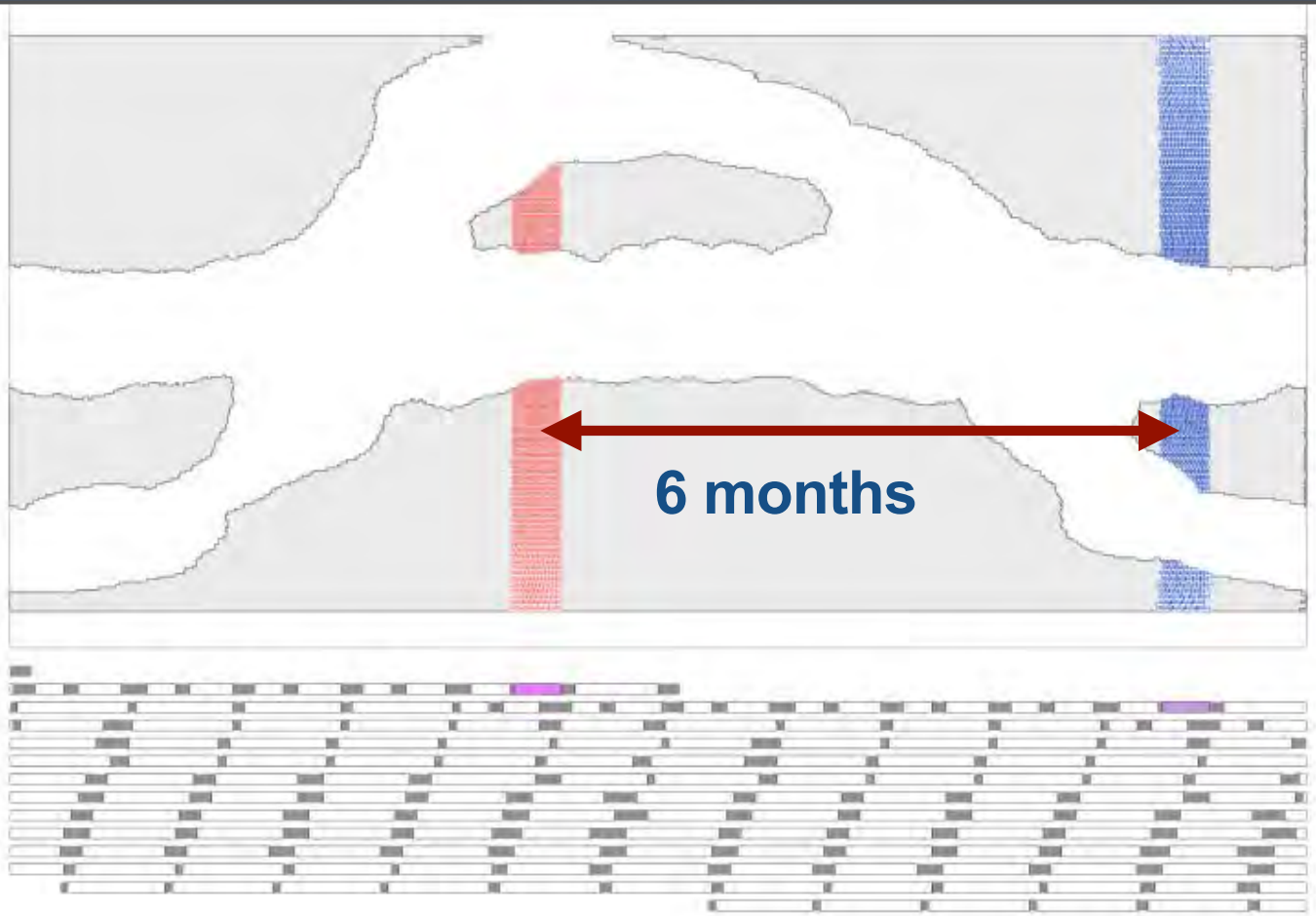
2
- Green patch increases
- Orange patch decreases

3
- Orange patch merges with blue path

- At high temperatures, the algorithm accepts intermediate configurations, worst than current, thus avoiding *local minima*;
- At low temperatures, only better configurations are accepted;
- Convergence to a *good minima* is controlled by a slow lowering of temperature.

J. Dinis (adaptive tiling: keep same alpha within local rectangle but waste some overlaps at boundaries)

at a given time can observe towards leading or trailing direction, i.e. two "strips" (limited pitch angle) separated in by 180 deg in ecliptic longitude



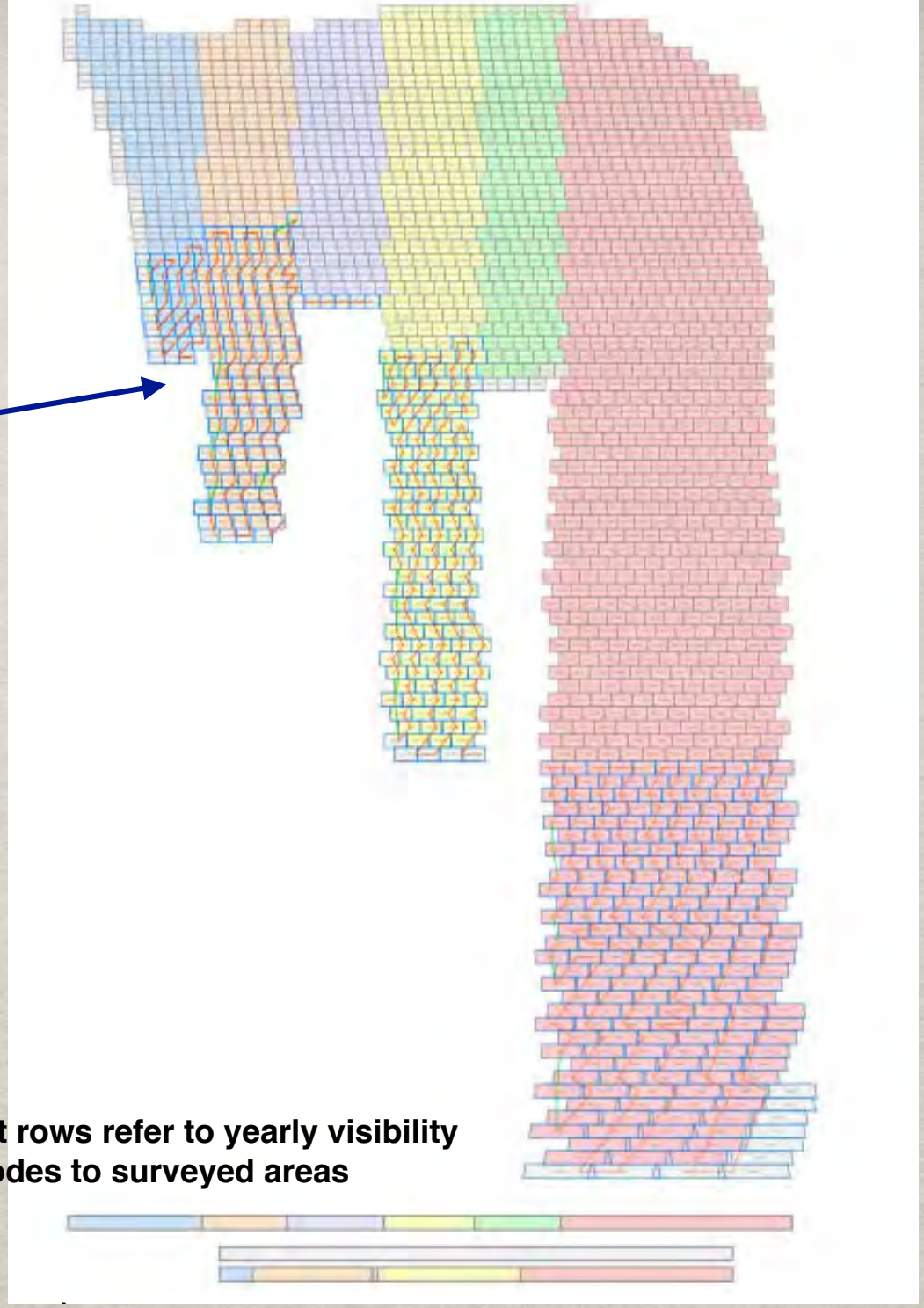
Straight-stripes: select fields in-sync with orbit.

Rationale: make transitions from patch to patch in-sync with orbit
keeps observations near zero alpha.

Disadvantage: patches are not as wide as it can be
does not promote easy side-by-side match (and compensate cal-windows)

J. Dinis

João Dinis– ESSWG – teleconf on 2015-04-21



Local tesselations,
~1.6% overlaps
tilts -7<—> 5 degs

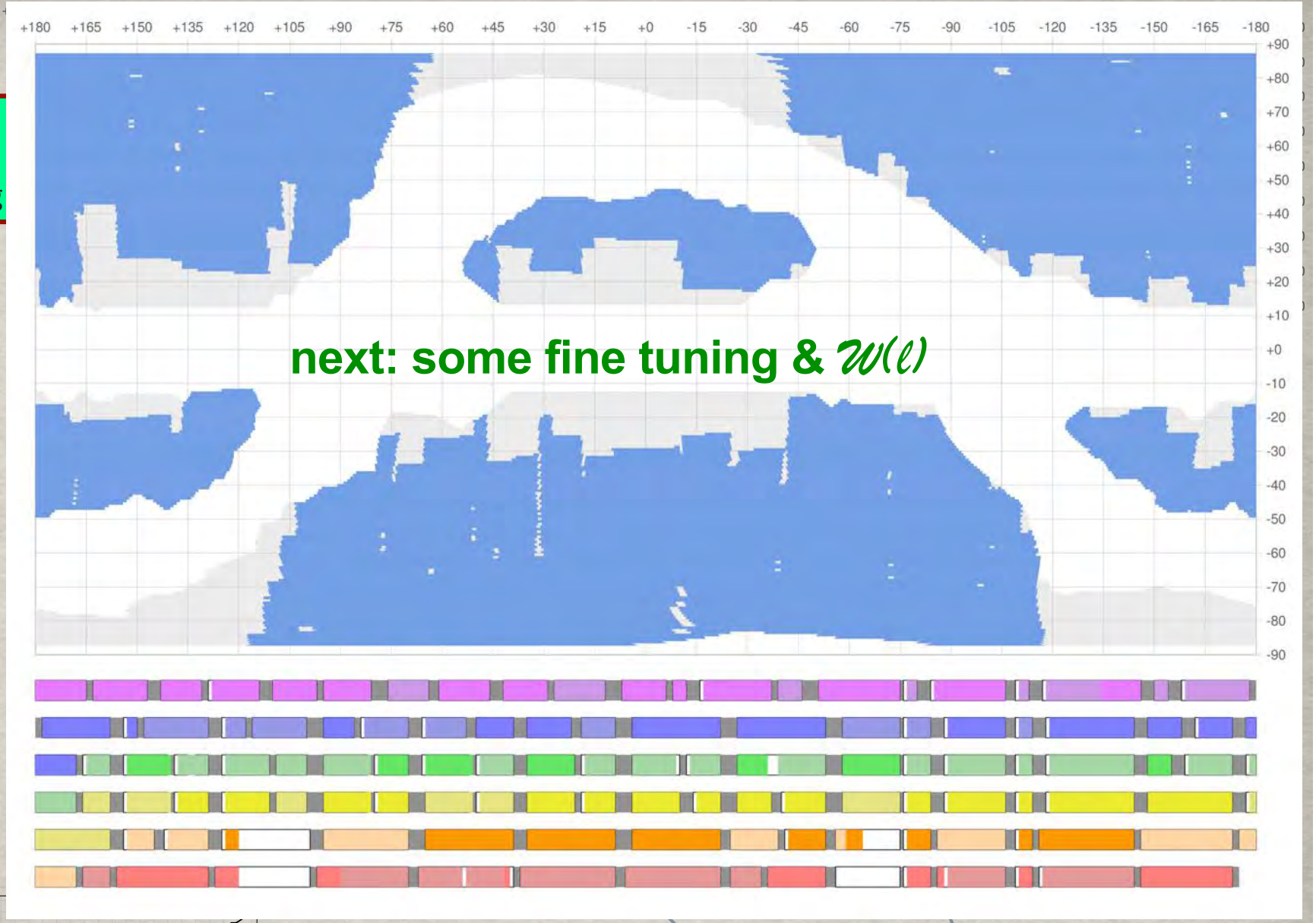
Different rows refer to yearly visibility
Color codes to surveyed areas

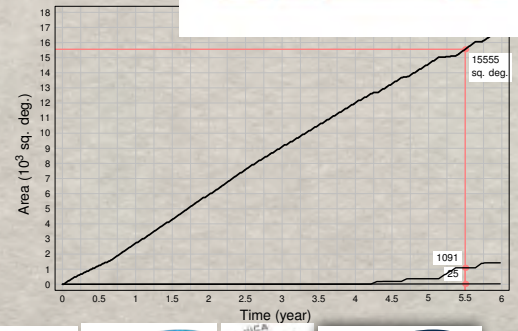
J. Dinis

Light and dark colors are trailing and leading

J. Dinis

6 years of observations unfolded

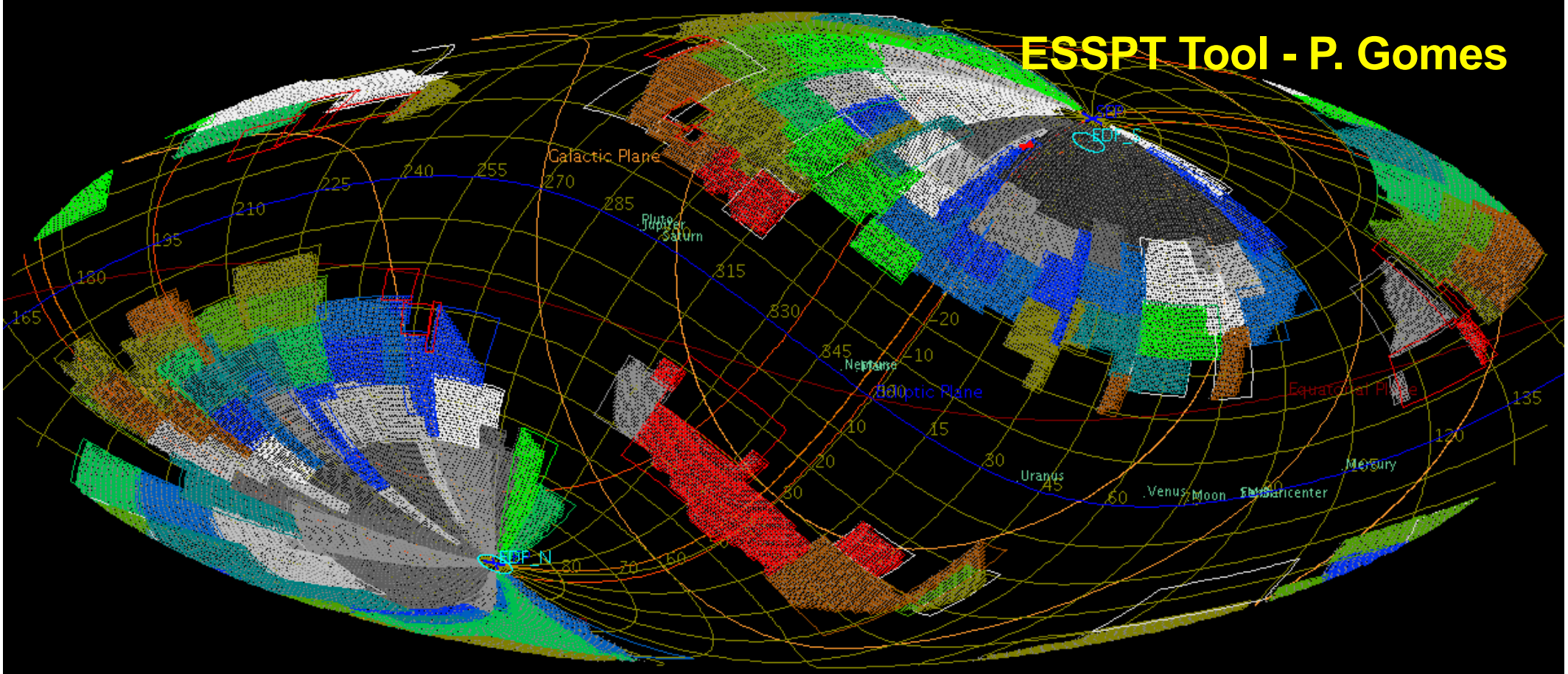


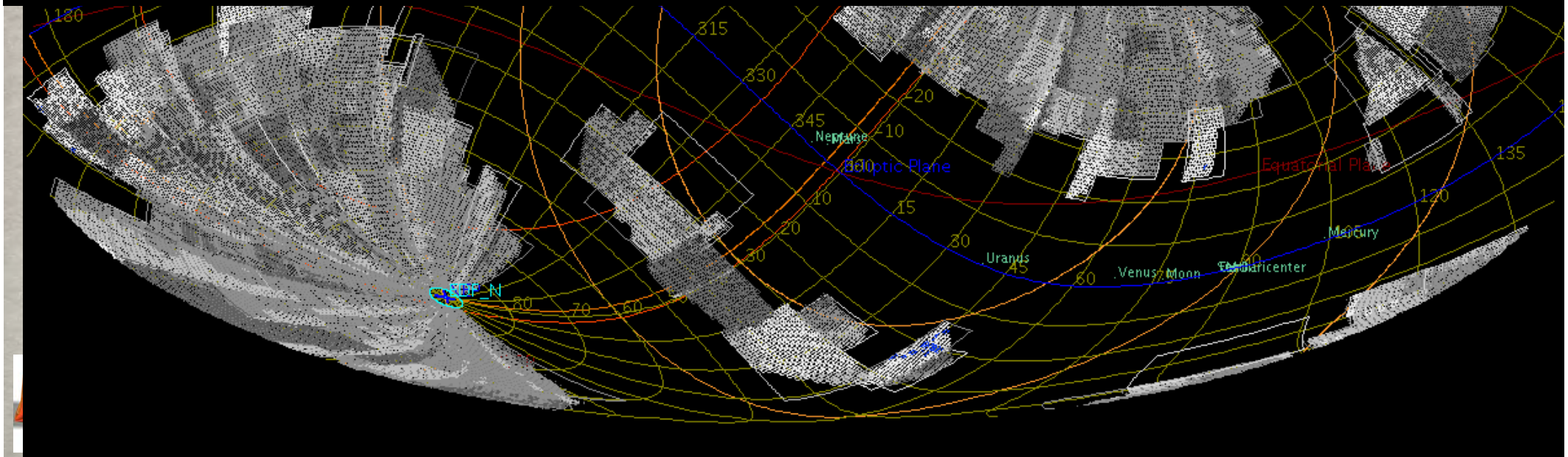


Reserved for calibrations

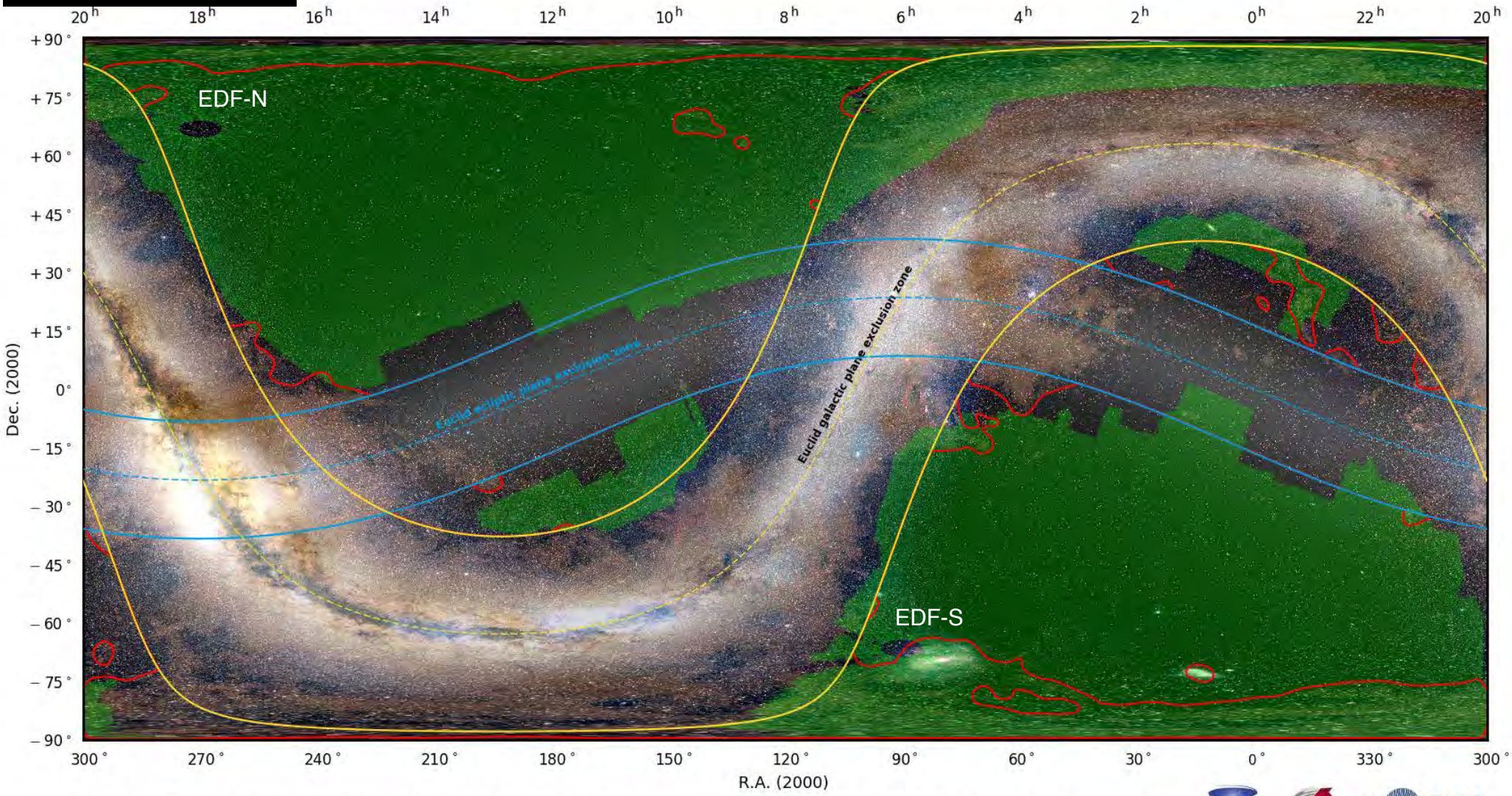
Fulfill > 15,000 sq degs (+ calibs + deep fields + manouvers) in 5.5 years [t_exp=4400s]

ESSPT Tool - P. Gomes





J.C. Cuillandre



The Euclid Reference Survey (SPV, 2017, green overlay) versus the Red Book limits (ground surveys)

Ecliptic plane [zodical light background] : +/- 15 deg. ecliptic latitude exclusion zone

Galactic plane [stellar contamination] : +/- 25 deg. galactic latitude exclusion zone

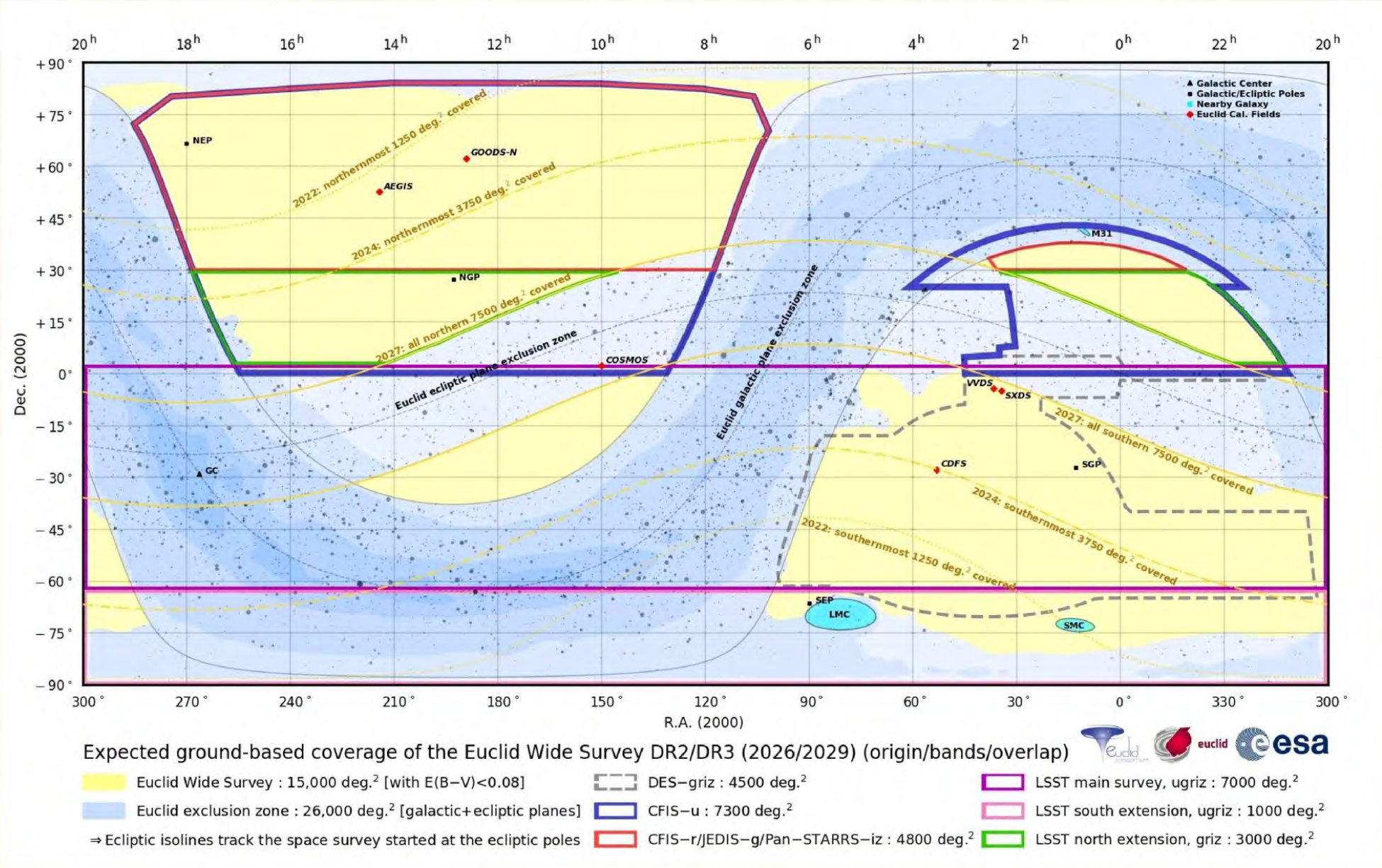
Absorption [dust] : E(B-V)<0.08 + holes&islands avoided by pushing locally up to 0.15

Background image: Euclid Consortium / A. Mellinger / Planck Collaboration

Survey SPV (weight only for spectra)

J.C- Cuillandre

Euclid & LSST synergy: 2/3 of Euclid Wide + 1 Deep Field

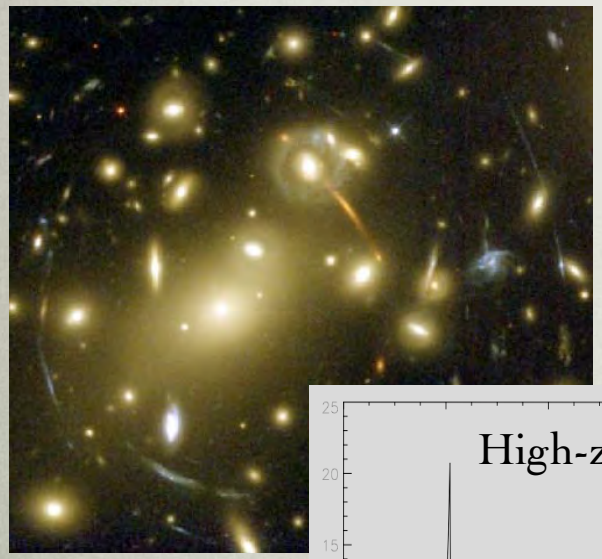


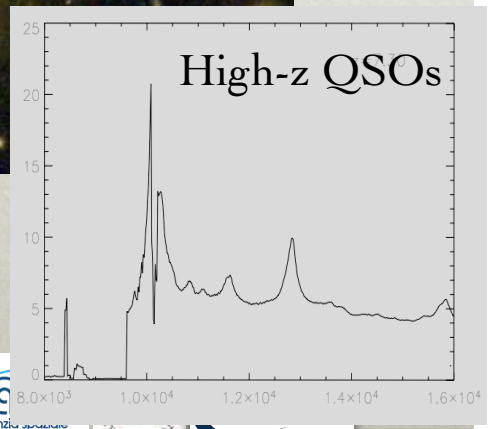
– Advanced discussions between the Euclid Consortium and LSST have started

– The "LSST and Euclid Synergy" White Paper out fall 2017 (Rhodes et al.)

- ***Unique*** **legacy survey**: 2 billion galaxies imaged in optical/NIR to mag >24 Million NIR galaxy spectra, full extragalactic sky coverage, Galactic sources
- Unique database for **various fields in astronomy**: galaxy evolution, search for high-z objects, clusters, strong lensing, brown dwarfs, exo-planets, etc
- **Synergies with other facilities**: JWST, Planck, Erosita, GAIA, DES, Pan-STARSS, LSST, E-ELT etc (e.g. to do NIR from the ground would take several x 10^3 yr)
- **All data publicly available** through a legacy archive

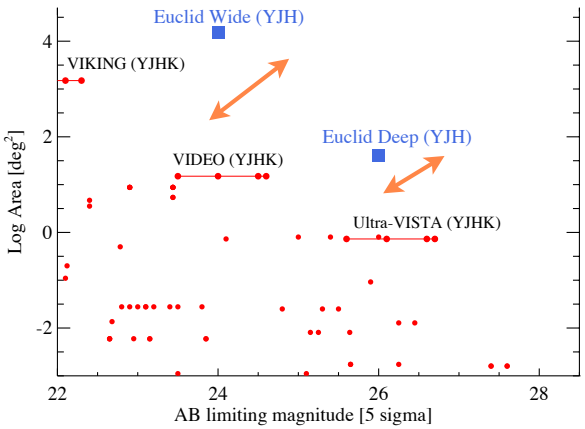
Enormous database to harvest



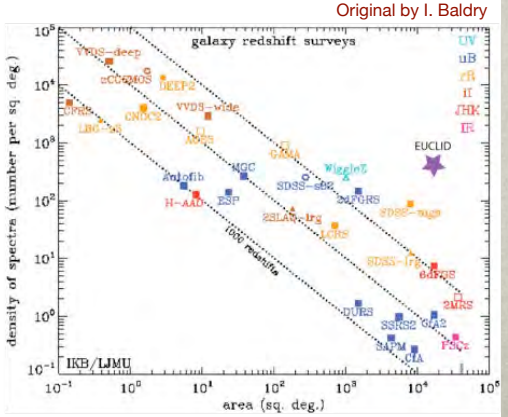


Euclid in context

	VISTA	SASIR	Euclid
Wide survey	680 years	66 years	5 years
Deep survey	72 years	7 years	"5 years"



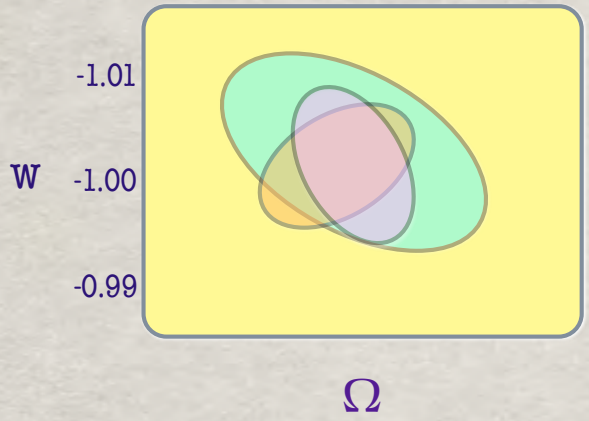
Original by I. Baldry



Possible outcomes.....

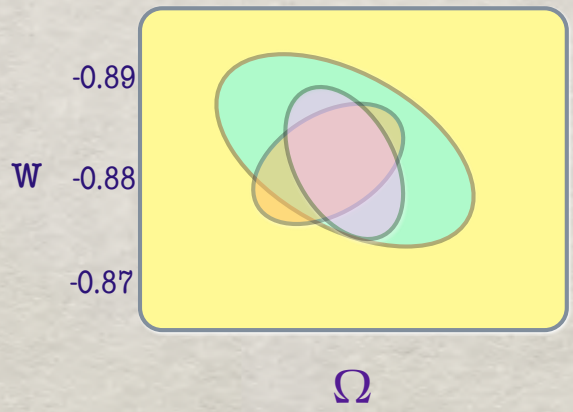
Different probes & experiments

Quite useful but a bit dull....



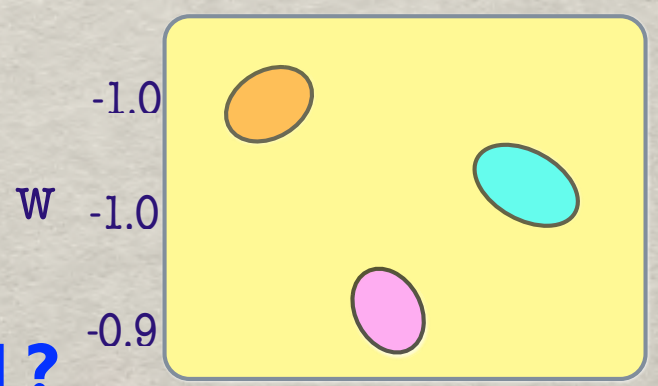
Λ = const

Quite interesting!



w ≠ -1

Much more interesting!!



?!?!?

A new paradigm would be needed ?

Summary:

★ ***Best*** science (cf Decadal)

★ Enormous Legacy

★ Tough but feasible

Stay tuned!

END