

Summary: Astrophysics from the Radio to the Submillimetre

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A Request...

Let us thank the Local Organizing Committee and the Scientific Organizing Committee for a fine conference!

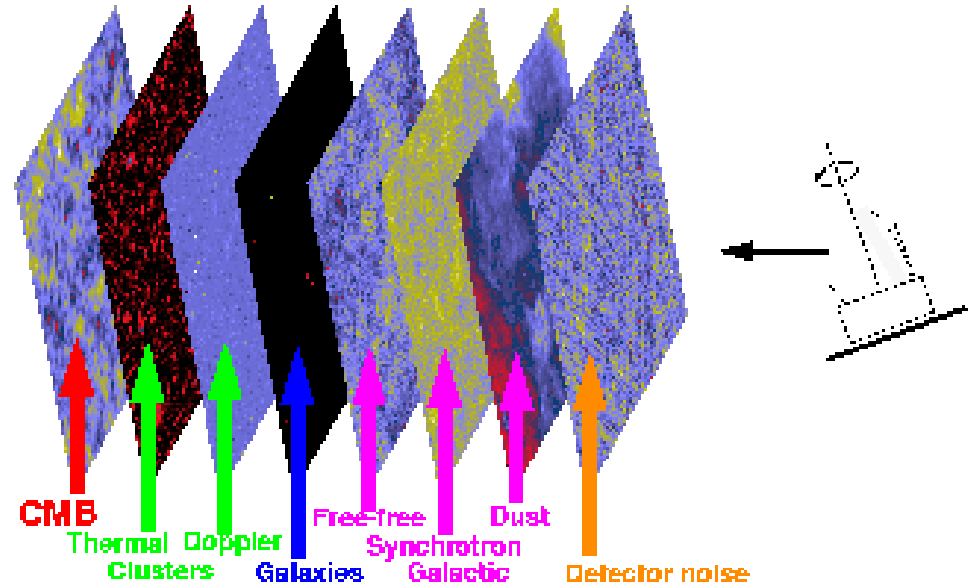
Opening the door to physics beyond the CMB was particularly welcome.

And now to some thoughts on the science itself...

The Veils



Salome and the 7 veils

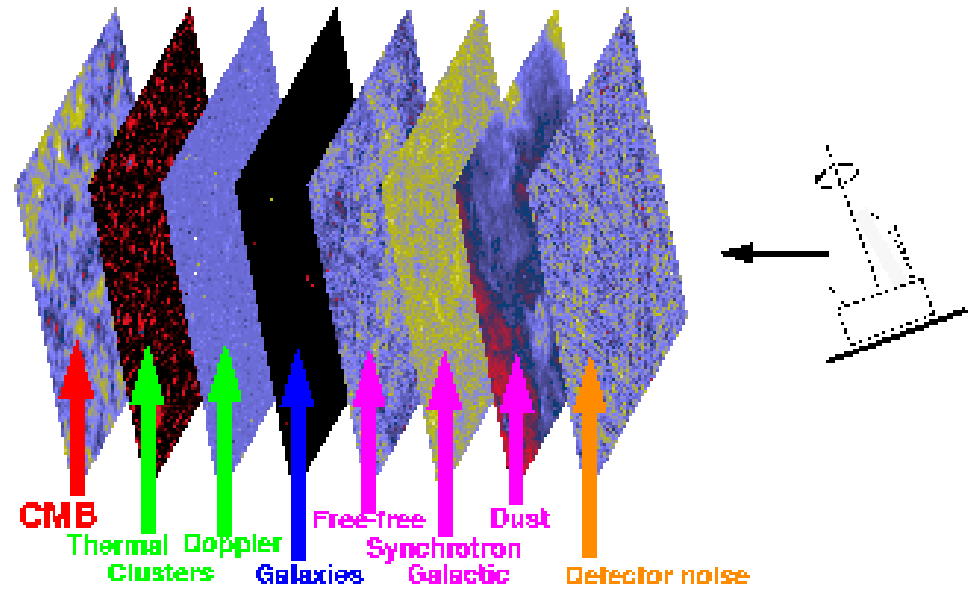


The CMB and the 10 veils

The Veils



Salome and the 7 veils



The CMB and the 10 veils

And: what do we learn from the veils?

The Veils (my list)

1. Atmosphere (solved May 14, 2009)
2. Zodiacal dust and other solar system foregrounds

Galaxy:

3. -- synchrotron
4. -- free-free
5. -- spinning dust
6. -- just plain dust
7. Point sources and the CIB
8. SZ screen
9. Lensing screen
10. Reionization

The 10 Veils

1. Atmosphere (solved May 14, 2009)
2. Zodiacal dust etc. (awaits Planck maps)

Galaxy:

3. -- synchrotron
4. -- free-free
5. -- spinning dust
6. -- just plain dust
7. Point sources and the CIB
8. SZ screen
9. Lensing screen
10. Re-ionization (mixed with cosmological issues; deferred until 2013))

I became a cosmologist because cosmology was simple (remember the days when cosmology was “A science of two numbers”?)

And especially to avoid nastiness like dust and magnetic fields.

And molecules.

I became a cosmologist because the Universe was simple (remember the days when cosmology was “A science of two numbers”?)

And especially to avoid nastiness like dust and magnetic fields.

And molecules.

-- and here is room full of cosmologists worrying about (or delighted by) dust, magnetic fields and molecules

Why the Attention to Foregrounds?

We must understand the Galactic and other veils...

- (1) Because we need to peel them back them to get at the cosmology (King Herod's answer)
- (2) Because they are interesting in their own right
- (3) Because they improve the mission

An example: the CO Map

- (2) Correctly presented as a beautiful result in its own right
 - shows the power of all-sky surveys at Planck's sensitivity and angular resolution
 - new results, like the high-latitude clouds
- (1) Yet those same high-latitude clouds make it much harder to mask out CO contamination
- (3) Our ability to make the CO maps depends on a non-ideal feature of the 100 GHz bandpass – to make the CO map forced a careful evaluation of the band shapes.

Two other Examples

Anomalous Microwave Emission

And the Galactic haze

Both point to new physics

Both complicate component separation: neither the spectrum nor the distribution is simple.

Interactions between Veils

Veils are not completely separable:

CO affects measurements of compact sources

SZ and sources in clusters contaminate each other

I suspect we will be seeing more such interactions

Additional Themes

Synergy :

Herschel and Planck

X-ray & optical studies of SZ clusters

Planck and ground-based radio observations

...and let us not forget synergy between Planck and other CMB experiments

New Physics:

The CIB

Beautiful work – one highlight of Planck results to date

And an excellent example of synergy with other facilities (esp. Herschel)

To me, the issue is what makes up the CIB – how finely woven is the texture of the veil?

Which sources? Numbers and redshifts? Same issues faced us earlier with the XRB.

-- and same issues may be involved in NIRB and the radio background.

The Milky Way (at Multiple Wavelengths)

We can now study not just the Galactic zoo (cold cores, PN...) but

Galactic ecology

Crucial role of synergy with Herschel

A biased sample:

AME and haze already mentioned

Detailed studies of small regions (and local galaxies)

Structure of magnetic field (a crucial polarize foreground)

Star formation in filaments (grissini non gnocchi o pizze)

Star formation is not just by mergers...

New (Astro)physics

New astrophysics

Origin of cosmic B field

AME

Haze

Profile of re-ionization

Horizon scale dark flow

Possible new types of sources

New fundamental physics

Does $T(z) = T_0(z+1)$?

Shape & energy scale of inflationary potential

$N(v)$

Many of these Await CMB Results

Come back in January 2013!

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Like King Herod, we want to see Salome (CMB)

