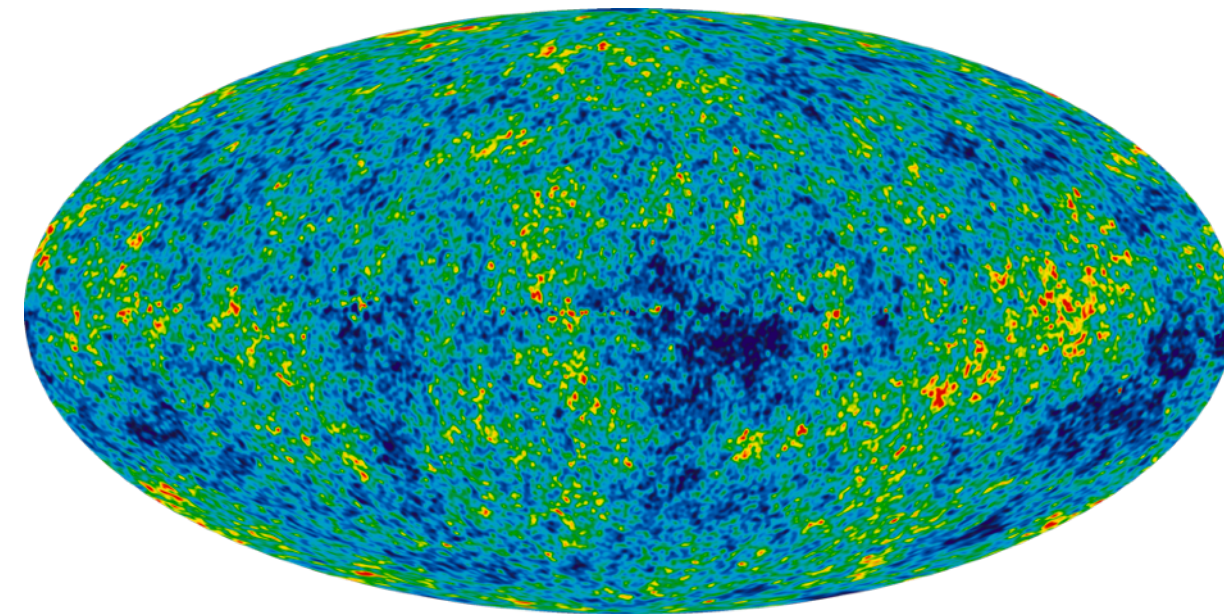


CAMB Tutorial

Code for Anisotropies in the Microwave Background



Cosmología - Primavera 2020

Daniela Grandón Silva

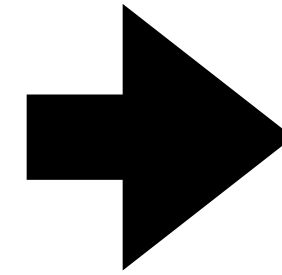
¿Por qué CAMB?

Necesitamos una herramienta precisa que sea capaz de tomar modelo cosmológico, resolver ecuaciones numéricas y desde ahí derivar las predicciones para los observables de interés, para luego hacer el contraste con las observaciones.

Existen códigos que simulan la evolución de las perturbaciones lineales en el Universo y calculan observables como el espectro de potencias del CMB y estructura a gran escala:
CAMB y CLASS

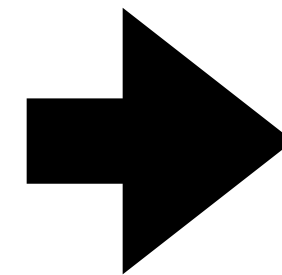
- **CAMB** (in f90) (Lewis & Challinor 1999)

<http://camb.info>



- **CLASS** (in C) (Lesgourgues & Tram 2011)

<http://class-code.net>



- CMB power spectra
- Transfer Functions
- Background Functions
- Matter Power Spectrum

Estructura de CAMB

Utilities

- bessels.f90
- inifile.f90
- Matrix_utils.f90
- subroutines.f90
- utils.F90
- writefits.f90

Cosmology

- camb.f90
- cmbmain.f90
- cosmorec.f90
- equations.f90
- halofit.f90
- hyrec.f90
- lensing.f90
- modules.f90
- power_tilt.f90
- recfast.f90
- reionization.90
- SeparableBispectrum.f90

Driver and params

- inidriver.F90
- params.ini

Estructura de CAMB

A closer look at cosmology

Evolution and transfer :

- equations.f90
- equations_ppf.f90

Initial power spectrum:

- power_tilt.f90
initial power parameters
definition and reading

Modules:

- Modules.f90
variables declaration, background
functions, $P(k)$, output

Recombination:

- recfast.f90
- cosmorec.f90
- hyrec.f90

CMB Cls:

- cmbmain.f90

Reionization:

- reionization.f90

CMB lensing:

- lensing.f90

Non linear $P(k)$:

- halofit.f90
- halofit_ppf.90

Bispectrum:

- SeparableBispectrum.f90

Instalación de CAMB

Original (Fortran)

Paso a paso:
<https://camb.info/readme.html>

Necesitan compilador Fortran 2008 (o mayor): *gfortran* versión > 6 o *ifort*

Download CAMB

If you agree to the licence please fill in the form below and press "Submit".

Licence

You are licensed to use this software free of charge on condition that:

- Any publication using results of the code must be submitted to [arXiv](#) at the same time as, or before, submitting to a journal. arXiv must be updated with a version equivalent to that accepted by the journal on journal acceptance.
- If you identify any bugs you report them as soon as confirmed

Your Name:

Daniela Grandon

E-Mail Address:

dgrandons@gmail.com

Add to Mailing List:

☒ Yes

☐ No

I agree to licence:

☒ Yes

☐ No

Submit

Clear-Form

You are encouraged to add yourself to the mailing list - you will then be informed about any bugs, and will also get news of new versions.



Antony Lewis

antony@cosmologist.info

a través de

ayin.pair.com

para mí

▼

Please download the program from

<http://camb.info/emaildownld.php>

Antony Lewis

Instalación de CAMB

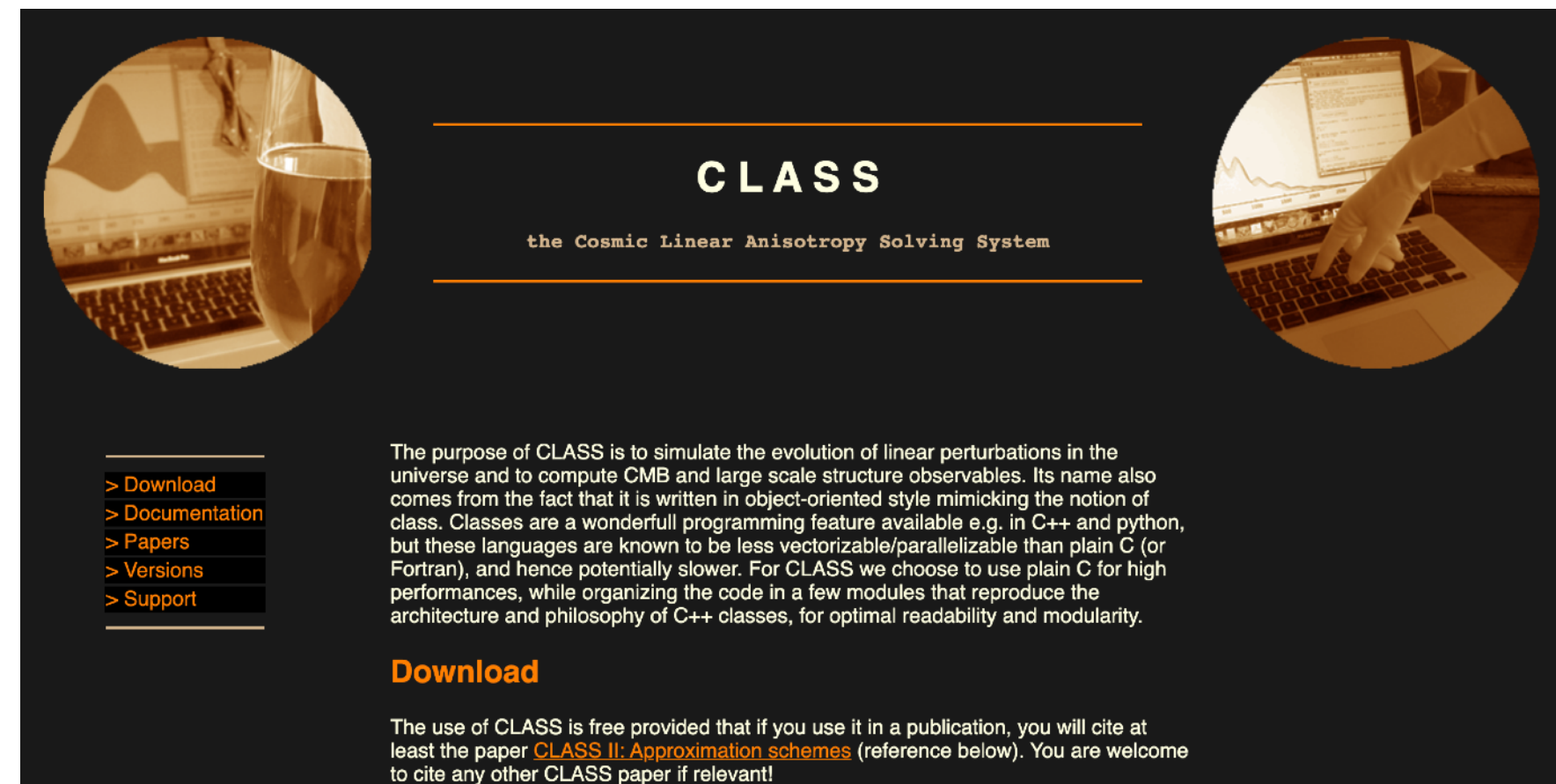
Python wrapper

```
pip install camb [--user]
```

```
conda install -c conda-forge camb
```

Bonus: Instalación de CLASS

https://lesgourg.github.io/class_public/class.html



Download from:

https://lesgourg.github.io/class_public/class_public-2.9.4.tar.gz

Unpack the archive:

```
tar -zxvf class_public-vx.y.z.tar.gz
```

Go to the class directory:

```
cd class_public-vx.y.z
```

Compile:

```
make clean
```

```
make class
```

Python wrapper: https://github.com/lesgourg/class_public/wiki/Python-wrapper