



National Aeronautics and Space
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ABOUT LAMBDA

LAMBDA - Tools

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CAMB Web Interface

Most of the [configuration documentation](#) is provided in the sample parameter file provided with the application.

Supports the April 2014 Release

This form uses JavaScript to enable certain layout features, and it uses Cascading Style Sheets to control the layout of all the form components. If either of these features are not supported or enabled by your browser, this form will NOT display correctly.

Descriptive information for the CAMB parameters can be found at: <http://cosmologist.info/notes/CAMB.pdf>

Actions to Perform

<input checked="" type="checkbox"/> Scalar C_l 's <input type="checkbox"/> Vector C_l 's <input type="checkbox"/> Tensor C_l 's	<input type="checkbox"/> Do Lensing <input checked="" type="checkbox"/> Transfer Functions	<input type="radio"/> Linear <input checked="" type="radio"/> Non-linear Matter Power (HALOFIT) <input type="radio"/> Non-linear CMB Lensing (HALOFIT) <input type="radio"/> Non-linear Matter Power and CMB Lensing (HALOFIT)	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">None ▼</div> Sky Map Output
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- Vector C_l 's are incompatible with Scalar and Tensor C_l 's. The Transfer functions require Scalar and/or Tensor C_l 's.
- The HEALpix synfast program is used to generate maps from the resultant spectra. The random number seed governs the phase of the a_{lm} 's generated by synfast. The default of zero causes synfast to generate a new seed from the system time with each run. Specifying a fixed nonzero value will return fixed phases with successive runs.

Maximum Multipoles and $k\eta$

Scalar	Tensor
<input type="text" value="2200"/> l_{\max}	<input type="text" value="1500"/> l_{\max}
<input type="text" value="4000"/> $k\eta_{\max}$	<input type="text" value="3000"/> $k\eta_{\max}$

- Tensor limits should be less than or equal to the scalar limits.

Cosmological Parameters

Use Physical Parameters? No ▼ <input type="text" value="70"/> Hubble Constant	<input type="text" value="0.0445"/> Ω_{baryon}	<input type="text" value="0.24"/> Helium Fraction
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<input type="text" value="2.7255"/> T_{cmb}	<input type="text" value="0.246"/> Ω_{cdm}	<input type="text" value="2.046"/>
	<input type="text" value="0.7095"/>	Massless Neutrinos
	Ω_{lambda}	<input type="text" value="1"/>
	<input type="text" value="0"/>	Massive Neutrinos
	Ω_{neutrino}	<input type="text" value="-1"/>
		Eqn. of State
		<input type="text" value="1"/>
		Comoving Sound Speed
		<input type="button" value="Yes"/>
		Share ΔN_{neff}

- The Equation of State entry is the effective equation of state parameter for dark energy and is assumed constant.
- The Comoving Sound Speed parameter is the constant comoving sound speed of the dark energy; 1=quintessence.
- Setting Degeneracies to zero sets the mass degeneracies parameter to massive neutrinos. Otherwise this should be a space separated list of values, one per eigenstate.
- Fractions should be a space separated list indicating the fraction of $\Omega_{\nu}h^2$ accounted for by each eigenstate.

ReionizationInclude Reionization? **Power Spectrum**

<input type="text" value="1"/>
Number
<input type="text" value="2.46e-9"/>
Scalar Amplitude
<input type="text" value="0.96"/>
Scalar Spectral Index
<input type="text" value="0"/>
Scalar Run Count
<input type="text" value="0"/>
Scalar Run Run Count
<input type="text" value="0"/>
Tensor Spectral Index
<input type="text" value="1"/>
Tensor
Parameterization
<input type="text" value="0"/>
Tensor Run Count
<input type="text" value="0"/>
Tensor Amplitude
<input type="text" value="1"/>
Initial Ratio

Normalization

Use the COBE
Normalization?
<input type="button" value="No"/>
CMB Output Scale
<input type="text" value="7.43e12"/>
0.005
Scalar Pivot
<input type="text" value="0.005"/>
Tensor Pivot

Transfer Function

Settings
High Precision? <input type="button" value="Yes"/>
Matter/Power
<input type="button" value="Interpolated Grid"/>
<input type="text" value="1000"/>
kmax
<input type="text" value="50"/>
k per logint
<input type="text" value="11"/>
Number of Redshifts
<input type="text" value="0"/>
Redshifts

- The ratio is that of the initial tensor/scalar power spectrum amplitudes. The vector modes use the scalar settings.
- Supply 'Number' values in each after the first, separated by spaces.
- To get μK^2 , set a realistic initial scalar amplitude (e.g., 2.3e-9) and the output scale factor to $\sim 7.43e12$; for dimensionless transfer functions, set scalar amp to 1 and the output scale factor to 1.
- kmax=0.5 is enough for sigma_8. Each redshift must be supplied, separated by spaces. They will be sorted into descending order.

Initial Scalar Perturbation Mode**For Vector Modes:****Recombination**

<input type="text" value="1.14"/>
RECFAST
<input type="text" value="0.86"/>
RECFAST He
<input type="text" value="6"/>

Bispectrum**Parameters**

<input type="button" value="No"/> Do
Lensing?
<input type="button" value="No"/> Do
Primordial?

RECFAST He Switch

Yes ▼

RECFAST H Switch

- Bispectrum: Primordial is currently only a local model ($f_{nl}=1$) and can take several minutes to run. Lensing is fairly quick.
- Separate the Bispectrum delta values with spaces.

Performance and Reporting Parameters

Feedback Level ▼

Lensing Method

 ▼Accurate BB ▼Accurate EE ▼Tensor Neutrinos ▼

Massive Neutrino Approx

 ▼Accurate Polarization ▼Truncate late radiation heirarchies ▼ Accuracy

Boost

 'l' Accuracy

Boost

 'l' Sample

Boost

- Massive Neutrino Approximation: The series velocity weight option: switch to this approximation once non-relativistic. The fast approximation scheme is a CMB-only option, accurate for light neutrinos.
- Accurate EE: Set to yes if you are bothered about percent accuracy on EE from reionization.
- Tensor Neutrinos: Indicates whether or not to include neutrinos in the tensor evolution equations.
- Truncate late radiation heirarchies: Indicates whether or not to turn off small-scale late tume radiation heirarchies. This is a time versus accuracy tradeoff.
- Accuracy Boosts: Higher numbers improve accuracy by reducing time steps.

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Comments/Feedback

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