J/A+A/596/A100 Planck high-z source candidates catalog (PHZ) (Planck+, 2016)

Planck intermediate results. XXXIX.
The Planck list of high-redshift source candidates.

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Abstract:
The Planck mission, thanks to its large frequency range and all-sky coverage, has a unique potential for systematically detecting the brightest, and rarest, submillimetre sources on the sky, including distant objects in the high-redshift Universe traced by their dust emission. A novel method, based on a component-separation procedure using a combination of Planck and IRAS data, has been validated and characterized on numerous simulations, and applied to select the most luminous cold submillimetre sources with spectral energy distributions peaking between 353 and 857GHz at 5' resolution. A total of 2151 Planck high-z source candidates (the PHZ) have been detected in the cleanest 26% of the sky, with flux density at 545GHz above 500mJy. Embedded in the cosmic infrared background close to the confusion limit, these high-z candidates exhibit colder colours than their surroundings, consistent with redshifts z>2, assuming a dust temperature of Txgal=35K and a spectral index of βxgal=1.5. Exhibiting extremely high luminosities, larger than $10^{14}L_{\odot}$, the PHZ objects may be made of multiple galaxies or clumps at high redshift, as suggested by a first statistical analysis based on a comparison with number count models. Furthermore, first follow-up observations obtained from optical to submillimetre wavelengths, which can be found in companion papers, have confirmed that this list consists of two distinct populations. A small fraction (around 3%) of the sources have been identified as strongly gravitationally lensed star-forming galaxies at redshift 2 to 4, while the vast majority of the PHZ sources appear as overdensities of dusty star-forming galaxies, having colours consistent with being at z>2, and may be considered as proto-cluster candidates. The PHZ provides an original sample, which is complementary to the Planck Sunyaev-Zeldovich Catalogue (PSZ2); by extending the population of virialized massive galaxy clusters detected below z<1.5 through their SZ signal to a population of sources at z>1.5, the PHZ may contain the progenitors of today's clusters. Hence the Planck list of high-redshift source candidates opens a new window on the study of the early stages of structure formation, particularly understanding the intensively star-forming phase at high-z.

Description:
We present in this work the Planck List of Highredshift Source

Candidates (the "PHZ"), which includes 2151 sources distributed over 26% of the sky, with redshifts likely to be greater than 2.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
phz.dat	1065	2151	Planck high-z source candidates catalog (PHZ)
phz.fits	2880	340	PHZ catalog in fits

See also:

VIII/88 : Planck Early Release Compact Source Catalogue (Planck, 2011)
VIII/91 : Planck Catalog of Compact Sources Release 1 (Planck, 2013)
J/A+A/581/A14 : Updated Planck catalogue PSZ1 (Planck+, 2015)

Byte-by-byte Description of file: phz.dat

Bytes	Format	Units	Label	Explanations
1- 17	A17	---	Name	Source name, PHz GLLL.ll+BB.bb (NAME)
19- 28	F10.6	deg	GLON	Galactic longitude based on morphology fitting (GLON)
30- 37	F8.4	deg	GLAT	Galactic latitude based on morphology fitting (GLAT)
39- 48	F10.6	deg	RAdeg	Right ascension (J2000) (RA)
50- 59	F10.6	deg	DEdeg	Declination (J2000) (DEC)
61- 68	F8.5	---	SNRX545	S/N in the 545-GHz excess map (SNR_X545)
70- 76	F7.5	---	SNRD857	S/N in the 857-GHz cleaned map (SNR_D857)
78- 85	F8.5	---	SNRD545	S/N in the 545-GHz cleaned map (SNR_D545)
87- 94	F8.5	---	SNRD353	S/N in the 353-GHz cleaned map (SNR_D353)
96-103	F8.5	arcmin	maj	FWHM along the major axis of the elliptical Gaussian (GAU$_{MAJOR}$AXIS)
105-112	F8.6	arcmin	e_maj	rms uncertainty of the FWHM along the major axis (GAU$_{MAJOR}$AXIS_SIG)
114-121	F8.5	arcmin	min	FWHM along the minor axis of the elliptical Gaussian (GAU$_{MINOR}$AXIS)
123-130	F8.6	arcmin	e_min	rms uncertainty of the FWHM along the minor axis (GAU$_{MINOR}$AXIS_SIG)
132-139	F8.6	rad	PA	Position angle of the elliptical Gaussian (GAU$_{POSITION}$ANGLE)
141-148	F8.6	rad	e_PA	rms uncertainty of the position angle (GAU$_{POSITION}$ANGLE_SIG)
150-157	F8.6	Jy	F857	Flux density of the source at 857 GHz (FLUX$_{CLEAN}$857)
159-166	F8.6	Jy	e_F857s	rms uncertainty at 857 GHz due to sky confusion (FLUX$_{CLEAN}$857$_{SIG}$SKY)
168-175	F8.6	Jy	e_F857d	rms uncertainty at 857 GHz due to measurement error (FLUX$_{CLEAN}$857$_{SIG}$DATA)
177-184	F8.6	Jy	e_F857g	rms uncertainty at 857 GHz due to elliptical Gaussian fit accuracy (FLUX$_{CLEAN}$857$_{SIG}$GEOM)
186-193	F8.6	Jy	F545	Flux density of the source at 545 GHz (FLUX$_{CLEAN}$545)
195-202	F8.6	Jy	e_F545s	rms uncertainty at 545 GHz due to sky confusion (FLUX$_{CLEAN}$545$_{SIG}$SKY)
204-211	F8.6	Jy	e_F545d	rms uncertainty at 545 GHz due to measurement error (FLUX$_{CLEAN}$545$_{SIG}$DATA)
213-220	F8.6	Jy	e_F545g	rms uncertainty at 545 GHz due to elliptical Gaussian fit accuracy (FLUX$_{CLEAN}$545$_{SIG}$GEOM)
222-229	F8.6	Jy	F353	Flux density of the source at 353 GHz (FLUX$_{CLEAN}$353)
231-238	F8.6	Jy	e_F353s	rms uncertainty at 353 GHz due to sky confusion (FLUX$_{CLEAN}$353$_{SIG}$SKY)
240-247	F8.6	Jy	e_F353d	rms uncertainty at 353 GHz due to measurement error (FLUX$_{CLEAN}$353$_{SIG}$DATA)
249-256	F8.6	Jy	e_F353g	rms uncertainty at 353 GHz due to elliptical Gaussian fit accuracy (FLUX$_{CLEAN}$353$_{SIG}$GEOM)
258-265	F8.6	Jy	F217	Flux density of the source at 217 GHz (FLUX$_{CLEAN}$217)
267-274	F8.6	Jy	e_F217s	rms uncertainty at 217 GHz due to sky confusion (FLUX$_{CLEAN}$217$_{SIG}$SKY)
276-283	F8.6	Jy	e_F217d	rms uncertainty at 217 GHz due to measurement error (FLUX$_{CLEAN}$217$_{SIG}$DATA)
285-292	F8.6	Jy	e_F217g	rms uncertainty at 217 GHz due to elliptical Gaussian fit accuracy

				(FLUX$_{CLEAN}$217$_{SIG}$GEOM)
294-300	F7.5	---	Prob	Colour-colour selection probability (PROB_COLCOL)
302-309	F8.6	mag	E(B-V)mn	Mean extinction E(B-V)xgal within the source PSF (EBV_MEAN)
311-319	F9.6	mag	E(B-V)ap	Aperture estimate of the extinction E(B-V)xgal within the source PSF (EBV_APER)
321-328	F8.6	mag	e_E(B-V)ap	rms uncertainty of the aperture extinction E(B-V)xgal within the source PSF (EBV$_{APER}$SIG)
330-333	F4.2	---	zph25K	Submm photometric redshift estimate with Txgal=25K (ZPHOT_25K)
335-342	F8.6	---	e_zph25K	Lower limit of the 68% confidence level on zph25K (ZPHOT$_{25K}$LOW)
344-351	F8.6	---	E_zph25K	Upper limit of the 68% confidence level on zph25K (ZPHOT$_{25K}$UP)
353-361	F9.6	---	zph25Kc2	Reduced chi2 on the best fits on zph25K (ZPHOT$_{25K}$CHI2)
363-366	F4.2	---	zph30K	Submm photometric redshift estimate with Txgal=30K (ZPHOT_30K)
368-375	F8.6	---	e_zph30K	Lower limit of the 68% confidence level on zph30K (ZPHOT$_{30K}$LOW)
377-384	F8.6	---	E_zph30K	Upper limit of the 68% confidence level on zph30K (ZPHOT$_{30K}$UP)
386-394	F9.6	---	zph30Kc2	Reduced chi2 on the best fits on zph30K (ZPHOT$_{30K}$CHI2)
396-399	F4.2	---	zph35K	Submm photometric redshift estimate with Txgal=35K (ZPHOT_35K)
401-408	F8.6	---	e_zph35K	Lower limit of the 68% confidence level on zph35K (ZPHOT$_{35K}$LOW)
410-417	F8.6	---	E_zph35K	Upper limit of the 68% confidence level on zph35K (ZPHOT$_{35K}$UP)
419-427	F9.6	---	zph35Kc2	Reduced chi2 on the best fits on zph35K (ZPHOT$_{35K}$CHI2)
429-432	F4.2	---	zph40K	Submm photometric redshift estimate with Txgal=40K (ZPHOT_40K)
434-441	F8.6	---	e_zph40K	Lower limit of the 68% confidence level on zph40K (ZPHOT$_{40K}$LOW)
443-450	F8.6	---	E_zph40K	Upper limit of the 68% confidence level on zph40K (ZPHOT$_{40K}$UP)
452-460	F9.6	---	zph40Kc2	Reduced chi2 on the best fits on zph40K (ZPHOT$_{40K}$CHI2)
462-465	F4.2	---	zph45K	Submm photometric redshift estimate with Txgal=45k (ZPHOT_45K)
467-474	F8.6	---	e_zph45K	Lower limit of the 68% confidence level on zph45K (ZPHOT$_{45K}$LOW)
476-483	F8.6	---	E_zph45K	Upper limit of the 68% confidence level on zph45K (ZPHOT$_{45K}$UP)
485-493	F9.6	---	zph45Kc2	Reduced chi2 on the best fits on zph45K (ZPHOT$_{45K}$CHI2)
495-498	F4.2	---	zph50K	Submm photometric redshift estimate with Txgal=50K (ZPHOT_50K)
500-507	F8.6	---	e_zph50K	Lower limit of the 68% confidence level on zph50K (ZPHOT$_{50K}$LOW)
509-516	F8.6	---	E_zph50K	Upper limit of the 68% confidence level on zph50K (ZPHOT$_{50K}$UP)
518-526	F9.6	---	zph50Kc2	Reduced chi2 on the best fits on zph50K (ZPHOT$_{50K}$CHI2)
528-539	E12.6	Lsun	LFIR25K	FIR luminosity estimate with Txgal=25K (LFIR_25K)
541-552	E12.6	Lsun	e_LFIR25K	Lower limit of the 68% confidence level on LFIR25K (LFIR$_{25K}$LOW)
554-565	E12.6	Lsun	E_LFIR25K	Upper limit of the 68% confidence level on LFIR25K (LFIR$_{25K}$UP)
567-578	E12.6	Lsun	LFIR30K	FIR luminosity estimate with Txgal=30K (LFIR_30K)
580-591	E12.6	Lsun	e_LFIR30K	Lower limit of the 68% confidence level on LFIR30K (LFIR$_{30K}$LOW)
593-604	E12.6	Lsun	E_LFIR30K	Upper limit of the 68% confidence level on LFIR30K (LFIR$_{30K}$UP)
606-617	E12.6	Lsun	LFIR35K	FIR luminosity estimate with Txgal=35K (LFIR_35K)
619-630	E12.6	Lsun	e_LFIR35K	Lower limit of the 68% confidence level on LFIR35K (LFIR$_{35K}$LOW)
632-643	E12.6	Lsun	E_LFIR35K	Upper limit of the 68% confidence level on LFIR35K (LFIR$_{35K}$UP)
645-656	E12.6	Lsun	LFIR40K	FIR luminosity estimate with Txgal=40K (LFIR_40K)
658-669	E12.6	Lsun	e_LFIR40K	Lower limit of the 68% confidence level on LFIR40K (LFIR$_{40K}$LOW)
671-682	E12.6	Lsun	E_LFIR40K	Upper limit of the 68% confidence level on LFIR40K (LFIR$_{40K}$UP)
684-695	E12.6	Lsun	LFIR45K	FIR luminosity estimate with Txgal=45K (LFIR_45K)
697-708	E12.6	Lsun	e_LFIR45K	Lower limit of the 68% confidence level on LFIR45K (LFIR$_{45K}$LOW)

710-721	E12.6	Lsun	E_LFIR45K	Upper limit of the 68% confidence level on LFIR45K ($LFIR_{45K}UP$)
723-734	E12.6	Lsun	LFIR50K	FIR luminosity estimate with Txgal=50K (LFIR_50K)
736-747	E12.6	Lsun	e_LFIR50K	Lower limit of the 68% confidence level on LFIR50K ($LFIR_{50K}LOW$)
749-760	E12.6	Lsun	E_LFIR50K	Upper limit of the 68% confidence level on LFIR50K ($LFIR_{50K}UP$)
762-774	E13.6	Msun/yr	SFR25K	Star Formation Rate estimate with Txgal=25K (SFR_25K)
776-788	F13.6	Msun/yr	e_SFR25K	Lower limit of the 68% confidence level on SFR25K ($SFR_{25K}LOW$)
790-802	F13.6	Msun/yr	E_SFR25K	Upper limit of the 68% confidence level on SFR25K ($SFR_{25K}UP$)
804-816	F13.6	Msun/yr	SFR30K	Star Formation Rate estimate with Txgal=30K (SFR_30K)
818-830	F13.6	Msun/yr	e_SFR30K	Lower limit of the 68% confidence level on SFR30K ($SFR_{30K}LOW$)
832-844	F13.6	Msun/yr	E_SFR30K	Upper limit of the 68% confidence level on SFR30K ($SFR_{30K}UP$)
846-858	F13.6	Msun/yr	SFR35K	Star Formation Rate estimate with Txgal=35K (SFR_35K)
860-872	F13.6	Msun/yr	e_SFR35K	Lower limit of the 68% confidence level on SFR35K ($SFR_{35K}LOW$)
874-886	F13.6	Msun/yr	E_SFR35K	Upper limit of the 68% confidence level on SFR35K ($SFR_{35K}UP$)
888-900	F13.6	Msun/yr	SFR40K	Star Formation Rate estimate with Txgal=40K (SFR_40K)
902-914	F13.6	Msun/yr	e_SFR40K	Lower limit of the 68% confidence level on SFR40K ($SFR_{40K}LOW$)
916-928	F13.6	Msun/yr	E_SFR40K	Upper limit of the 68% confidence level on SFR40K ($SFR_{40K}UP$)
930-942	F13.6	Msun/yr	SFR45K	Star Formation Rate estimate with Txgal=45K (SFR_45K)
944-956	F13.6	Msun/yr	e_SFR45K	Lower limit of the 68% confidence level on SFR45K ($SFR_{45K}LOW$)
958-970	F13.6	Msun/yr	E_SFR45K	Upper limit of the 68% confidence level on SFR45K ($SFR_{45K}UP$)
972-984	F13.6	Msun/yr	SFR50K	Star Formation Rate estimate with Txgal=50K (SFR_50K)
986-998	F13.6	Msun/yr	e_SFR50K	Lower limit of the 68% confidence level on SFR50K ($SFR_{50K}LOW$)
1000-1012	F13.6	Msun/yr	E_SFR50K	Upper limit of the 68% confidence level on SFR50K ($SFR_{50K}UP$)
1014-1063	A50	---	Pflag	Contains the list of Planck catalogues matching the source (XFLAG_PLANCK)
1065	I1	---	Hflag	[0/1] 1 if present in the Herschel follow-up programme (XFLAG_HERSCHEL)

Acknowledgements:
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(End) Patricia Vannier [CDS] 08-Dec-2016

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