1. Appendix: Description of the online catalog files

The complete results of the analyses described in **The Second *Fermi* Large Area Telescope Catalog of Gamma-ray Pulsars** are reported in online supplemental material available at `http://fermi.gsfc.nasa.gov/ssc/data/access/lat/2nd_PSR_catalog/`. The supplement is an electronic archive, provided as a tarred and gzipped file (2PC_auxiliary_files_v##.tgz). Inside the archive is a directory structure containing FITS files with tables reporting the analysis results, images of the light curves and spectral results for each pulsar, a text file containing the rotation ephemeris used in the analysis of each pulsar, and individual FITS files for each pulsar with the light curves and spectra in numerical form. This structure is described in Table 1.

Additional information, such as for example the half-widths at half-maximum of the leading and trailing edges of the peak fits described in Section 5 ("Profile Characterization"), and their uncertainties, is also provided. Another example is that in addition to the exponentially cut-off power law spectral parameters listed in the "Spectral Results" Tables, we provide the results of the pure power-law fits, and of the fits with the b parameter free for pulsars with $TS_{b\,free} \geq 9$. Detailed column descriptions for the main FITS tables and for the individual pulsar FITS tables follow below.

1.1. Detailed column descriptions of Main catalog FITS tables

The main catalog file, 2PC_catalog_v##.fits contains summary results for all 117 pulsars. The file contains four FITS table extensions: PULSAR_CATALOG, SPECTRAL, OFF_PEAK, and REFERENCES. The primary extension is empty. Table 2 details the contents of the PULSAR_CATALOG extension. This file is also duplicated in ascii format (2PC_catalog_v##.asc) with the four tables appended in the order listed above.

The PULSAR_CATALOG extension contains one row for each pulsar with most of the information provided in the Tables in this paper, as well as some additional quantities that can be computed from these results. Exceptions are the complete spectral analysis (reported in the SPECTRAL extension, Table 3), and the results of the off-peak analysis (reported in the OFF_PEAK extension, Table 4).

Table 1. LAT 2^{nd} Pulsar Catalog Auxiliary Files Description

Description	Filename(s) and path	Description of file contents
Main catalog FITS table	2PC_catalog_v##.fits	This file contains summary results for all 117 pulsars. The file contains four FITS table extensions: PULSAR_CATALOG, SPECTRAL, OFF_PEAK, and REFERENCES. The primary extension is empty. Section 1.1 provides descriptions of these extensions.
Main catalog ascii file	2PC_catalog_v##.asc	This file contains the same summary results for all 117 pulsars as in the previous file, but in ascii format. The four tables are appended in the ascii file in the order listed above.
Light curve images	/images/lightcurves/PNG & /images/lightcurves/PDF	These directories contain plots in both .pdf and .png format for each pulsar of the 100 MeV - 100 GeV and best-fit gamma-ray light curves, light curves in the 100 - 300 MeV, 300 MeV - 1 GeV, 1 - 3 GeV, greater than 3 GeV, and greater than 10 GeV bands, as well as the radio profile for the pulsar, when one exists.
SED images	/images/SED/PNG & /images/SED/PDF	These directories contain plots in both .pdf and .png format for each pulsar of the band-by-band energy fits plus the best-fit spectrum using the `PLSuperExpCutoff` model (a power law with exponential cutoff model where the exponential index is fixed at a value of 1).
Pulsar timing files	/par_files	This directory contains text files with the ephemerides and other timing parameters used in this work. The files are in Tempo2 format.
Individual pulsar data FITS files	/PSR_data/FITS	This directory contains FITS format tables for each pulsar with the spectral, light curve, and model data reported in this work. Each data file contains a number of FITS table extensions: PULSAR_SED, MODEL_SED, GAMMA_LC, BEST_FIT_LC, and RADIO_PROFILE (where a radio profile exists). The primary extension is empty. Detailed descriptions of these extensions are provided in Section 1.2
Individual pulsar data ascii files	/PSR_data/ascii	This directory contains the same results for each pulsar as in the previous directory, but in ascii format. The relevant extensions are appended in the ascii file in the order listed above.

Table 2. LAT 2nd Pulsar Catalog FITS format: PULSAR_CATALOG Extension

Name	Units	Description
PSR_Name	···	Pulsar name
RAJ2000, DEJ2000	deg	The pulsar position in celestial coordinates (J2000).
GLON, GLAT	deg	The pulsar position in galactic coordinates.
Period	ms	The pulsar rotation period.
P_Dot	s s^{-1}	The period first derivative, uncorrected for Shklovskii effect or Galactic acceleration, see Section 4.3.
E_Dot	erg s^{-1}	The pulsar spin-down luminosity, uncorrected for Shklovskii effect or Galactic acceleration, see Section 4.3.
F100, Unc_F100	ph cm^{-2}s^{-1}	The best-fit photon flux and statistical error, integrated from 100 MeV to 100 GeV. NULL values indicate unreliable spectral fits.
G100, Unc_G100	erg cm^{-2}s^{-1}	The best-fit energy flux and statistical error, integrated from 100 MeV to 100 GeV. NULL values indicate unreliable spectral fits.
TS_DC	···	The test statistic obtained at the position of the pulsar, assuming a `PLSuperExpCutoff` spectral model with the exponential index fixed to 1. The fit uses data from 100 MeV to 100 GeV, and includes all pulse phases except as noted in the "Spectral Results" Tables.
TS_Cutoff	···	The significance of the spectral cutoff, obtained from the improvement in log(Likelihood) from the `PLSuperExpCutoff` spectral model fit over the `PowerLaw` spectral fit.
TS_bfree	···	The improvement in the test statistic when the exponential index is left free in the `PLSuperExpCutoff` spectral fit. If there is no improvement, or the fit is worse, this value is zero.
Photon_Index, Unc_Photon_Index	···	The best-fit photon index and statistical error for the `PLSuperExpCutoff` spectral model. NULL values indicate unreliable spectral fits.
Cutoff, Unc_Cutoff	MeV	The best-fit cutoff energy and the statistical error for the `PLSuperExpCutoff` spectral model. NULL values indicate unreliable spectral fits.
Distance, Neg_Unc_Distance, Pos_Unc_Distance	pc	The pulsar's distance measurement and its uncertainties. NULL values indicate that only an upper limit has been determined.
UL_Distance	pc	Upper limit on pulsar distance when no measured value has been determined, NULL values indicate that a distance measurement has been determined.
Distance_Method,	···	The method used to determine the pulsar's distance. Methods are: `K` for the kinematic model, `DM` for the dispersion measure using the NE2001 model of Cordes & Lazio (2002), `O` for optical measurements, and `X` for X-ray measurements. `DMM` means that the distance to the Galaxy's edge, as determined by the maximum DM value provided by the NE2001 model for that line of sight, is taken as an upper limit.
Distance_Ref	···	Numerical reference for the distance measurement. The full reference is in the REFERENCES extension of this FITS file.
Prop_Motion, Unc_Prop_Motion	mas yr^{-1}	The proper motion and errors for the pulsar when available.
Prop_Motion_Ref	···	Numerical reference for the proper motion measurement. The full reference is in the REFERENCES extension of this FITS file.
P_Dot_Int, Neg_Unc_P_Dot_Int , Pos_Unc_P_Dot_Int	s s^{-1}	The intrinsic P-dot and associated errors, after contributions from the Shklovskii effect and Galactic acceleration have been removed, see Section 4.3.
E_Dot_Int, Neg_Unc_E_Dot_Int, Pos_Unc_E_Dot_Int	erg s^{-1}	The intrinsic spin down power and associated errors.

Table 2—Continued

Name	Units	Description
Luminosity, Unc_Luminosity, Neg_Sys_Luminosity, Pos_Sys_Luminosity	erg s^{-1}	The pulsar luminosity, statistical error, and systematic errors. Systematic errors are derived from the distance uncertainty. Values are NULL when only an upper limit exists.
UL_Luminosity	erg s^{-1}	Upper limit on the luminosity when no value has been determined. Entries are NULL when a value has been determined. NULL values in all Luminosity columns indicate unreliable spectral fits.
Efficiency, Unc_Efficiency, Neg_Sys_Efficiency, Pos_Sys_Efficiency	percent	The pulsar efficiency, statistical error, and systematic errors from the distance measurement. Values are NULL when only an upper limit has been determined.
UL_Efficiency	percent	Upper limit on the pulsar efficiency. Entries are NULL when a value has been determined. NULL values in all Efficiency columns indicate unreliable spectral fits.
S1400	mJy	Radio flux density at 1400 MHz. In some cases, documented in Section 4.1, this value is extrapolated from measurements at other frequencies. Entries are NULL when only an upper limit has been reported.
UL_S1400	···	Upper limit on the radio flux density at 1400 MHz when no measurement has been reported. Entries are NULL when a value has been reported.
S1400_Ref	···	Numerical reference for the radio flux density measurement. The full reference is in the REFERENCES extension of this FITS file.
Num_Peaks	···	Number of peaks in the gamma-ray profile.
Shift_Method	···	Method used to choose the radio fiducial phase. Methods are: `p` for the peak radio intensity, `h` for an opposite hemisphere shift (0.5 phase shift from the peak intensity), `s` for the point of symmetry in the radio profile, and `o` for some other method as described in the text (used only for PSR J0534+2200).
Radio_Lag, Unc_Radio_Lag	···	Phase separation (δ) between the first gamma-ray peak and the radio peak, and the associated error on that separation.
Peak_Sep, Unc_Peak_Sep	···	Phase separation (Δ) between the first and last gamma-ray peaks, and the associated error on that separation. This value is `NULL` for pulsars with only a single gamma-ray peak.
HWHM_P1_L, Unc_HWHM_P1_L	···	Half-width half-max and corresponding uncertainty of the leading (left) first peak edge, as fitted. The best-fit light curve is in the BEST_FIT_LC extension in the individual FITS file for each pulsar.
HWHM_P1_R, Unc_HWHM_P1_R	···	Half-width half-max and corresponding uncertainty of the trailing (right) first peak edge, as fitted. The best-fit light curve is in the BEST_FIT_LC extension in the individual FITS file for each pulsar.
HWHM_P2_L, Unc_HWHM_P2_L	···	Half-width half-max and corresponding uncertainty of the leading (left) second peak edge, as fitted. The best-fit light curve is in the BEST_FIT_LC extension in the individual FITS file for each pulsar.
HWHM_P2_R, Unc_HWHM_P2_R	···	Half-width half-max and corresponding uncertainty of the trailing (right) second peak edge, as fitted. The best-fit light curve is in the BEST_FIT_LC extension in the individual FITS file for each pulsar.

Table 2—Continued

Name	Units	Description
H_ColDensity, Neg_Unc_H_ColDensity, Pos_Unc_H_ColDensity	cm^{-2}	Hydrogen column density and associated systematic errors from the distance measurement. The values are `NULL` when only an upper limit for the hydrogen column density exists.
UL_H_ColDensity	cm^{-2}	Upper limit on the hydrogen column density. Entries are NULL when a value has been reported.
XFlux_NonTherm, Unc_XFlux_NonTherm	erg $cm^{-2}s^{-1}$	Non-thermal unabsorbed X-ray energy flux and 90% CL statistical errors, in the 0.3-10 keV energy band. Spectrum is an absorbed power law, plus black body model when needed. Exceptions are PSRs J0633+1746 and J0659+1414 where a double black body plus power law model was used. Entries are NULL when only an upper limit has been reported.
UL_XFlux_NonTherm	erg $cm^{-2}s^{-1}$	Non-thermal X-ray energy flux upper limit. Entries are NULL when a value has been reported.
XFlux_PWN, Unc_XFlux_PWN	erg $cm^{-2}s^{-1}$	Estimated non-thermal X-ray flux and 90% CL statistical errors, from the brightest part of the associated plerion, in the 0.3-10 keV energy band.
X_Qual	···	Quality of X-ray detections: '0' indicates no confirmed counterpart, '1' indicates that a counterpart has been identified but with too few counts for further characterization, and '2' indicates that a counterpart has been identified with sufficient counts for spectral characterization.
Opt_Mag	···	Optical magnitude of the optical counterpart for the pulsar or pulsar system, where a counterpart is detected. NULL if no observation available.
LL_Opt_Mag	···	Y indicates that Opt_Mag is a lower limit on the optical magnitude.
Opt_Band	···	The filter used for the optical observation.
Opt_Object	···	Object to which the mesured optical flux pertains. The codes are B for binary system; U for upper limit; P = neutron star detected; P* = pulsed optical detection; P+ = pulsar candidate (possible unpulsed pulsar detection); C = companion detected ; N = nebula (PWN) detected.
Extinction, Neg_Unc_Extinction, Pos_Unc_Extinction	···	Optical extinction and associated errors derived from the hydrogen column density and using the relation of Fitzpatrick (1999). Entries are NULL when only an upper limit is reported.
UL_Extinction	···	Optical extinction upper limit when no value has been reported. Entries are NULL when a value has been reported.
Corr_OptFlux, Neg_Unc_OptFlux, Pos_Unc_OptFlux	erg $cm^{-2}s^{-1}$	Corrected (unabsorbed) optical energy flux in the V-band, and associated errors. The optical flux has been corrected for interstellar reddening, and scaled to the V-band (peak wavelength $\lambda = 5500$Å, bandwidth $\Delta\lambda = 890$Å) where necessary. Entries are NULL when only an upper limit has been reported.
UL_OptFlux	···	Upper limit on the corrected (unabsorbed) optical energy flux in the V-band when no measurement has been reported. Entries are NULL when a value has been reported.
Type	···	Indicates whether the pulsar is a young radio loud (`YRL`), young radio quiet (`YRQ`, S1400 $> 30\,\mu$Jy), or millisecond (`MSP`) pulsar.
Binary	···	`Y` indicates the pulsar is in a binary system.
History	···	Indicates whether the pulsar was discovered in radio (`Radio`), X-rays (`X-rays`), or gamma rays (`Gamma`).

The SPECTRAL extension (Table 3) contains the results of the spectral analysis, one row for each pulsar. Models used in the spectral analysis are PLEC1, PLEC, and PL. The spectral analysis is described in Section 6.1.

The `Prefactor`, `Scale`, `Photon_Index`, and `Cutoff` values for each pulsar using the PLEC1 model are provided. Results from the fit using the PLEC spectral model are only reported when $TS_{b\,free} \geq 9$. The differential spectrum of the PLEC spectral model (`PLSuperExpCutoff`) is defined as:

$$\frac{dN}{dE} = \texttt{Prefactor}\left(\frac{E}{\texttt{Scale}}\right)^{-\texttt{Photon\_Index}} \exp\left\{-\left(\frac{E}{\texttt{Cutoff}}\right)^{\texttt{Exponential\_Index}}\right\}. \quad (1)$$

while the differential spectrum of the PLEC1 model is Eq. 1 with `Exponential_Index` fixed to 1. When the PLEC fit is reported in the SPECTRAL extension, it includes the value for the `Exponential_Index`

The differential spectrum of the PL (`PowerLaw`) spectral model is defined as:

$$\frac{dN}{dE} = \texttt{Prefactor}\left(\frac{E}{\texttt{Scale}}\right)^{-\texttt{Photon\_Index}} \quad (2)$$

with the `Prefactor`, `Scale`, and `Photon_Index` for each pulsar using the PL model given in the SPECTRAL extension.

Table 3. LAT 2^{nd} Pulsar Catalog FITS format: SPECTRAL Extension

Name	Units	Description
PSR_Name	···	Pulsar name
On_Peak	···	`Y` indicates the spectral fit used only on-peak events.
TS_DC	···	The test statistic obtained at the position of the pulsar, assuming a `PLSuperExpCutoff` spectral model with the exponential index fixed to 1. The fit uses data from from 100 MeV to 100 GeV, and includes all pulse phases.
TS_Cutoff	···	The significance of the spectral cutoff, obtained from the improvement in log(Likelihood) from the `PLSuperExpCutoff` spectral model fit over the `PowerLaw` spectral fit.
TS_bfree	···	The improvement in the test statistic when the photon index is left free in the `PLSuperExpCutoff` spectral fit. If there is no improvement, or the fit is worse, this value is zero.
PLEC1_Prefactor, Unc_ECPL1_Prefactor	ph $cm^{-2}s^{-1}MeV^{-1}$	The best-fit prefactor and associated error for the spectral fit using a power law with exponential cutoff model where the exponential index is fixed at a value of 1.
PLEC1_Photon_Index, Unc_ECPL1_Photon_Index	···	The best-fit photon index and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is fixed at a value of 1.
PLEC1_Scale	MeV	The scaling energy for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is fixed at a value of 1.
PLEC1_Cutoff, Unc_PLEC1_Cutoff	MeV	The best-fit cutoff energy and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is fixed at a value of 1.
PLEC1_Flux, Unc_PLEC1_Flux	ph $cm^{-2}s^{-1}$	The photon flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is fixed at a value of 1.
PLEC1_EFlux, Unc_PLEC1_EFlux	erg $cm^{-2}s^{-1}$	The energy flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is fixed at a value of 1.
PLEC_Prefactor, Unc_PLEC_Prefactor	ph $cm^{-2}s^{-1}MeV^{-1}$	The best-fit prefactor and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_Photon_Index, Unc_PLEC_Photon_Index	···	The best-fit photon index and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_Scale	MeV	The scaling energy for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_Cutoff , Unc_PLEC_Cutoff	MeV	The best-fit cutoff energy and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_Exponential_Index, Unc_PLEC_Exponential_Index	···	The best-fit value and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_Flux, Unc_PLEC_Flux	ph $cm^{-2}s^{-1}$	The photon flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PLEC_EFlux, Unc_PLEC_EFlux	erg $cm^{-2}s^{-1}$	The energy flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PLSuperExpCutoff` model where the exponential index is left free.
PL_Prefactor, Unc_PL_Prefactor	ph $cm^{-2}s^{-1}MeV^{-1}$	The best-fit prefactor and associated error for the spectral fit using a `PowerLaw` model.
PL_Photon_Index, Unc_PL_Photon_Index	···	The best-fit photon index and associated error for the spectral fit using a `PowerLaw` model.
PL_Scale	MeV	The scaling energy for the spectral fit using a `PowerLaw` model.
PL_Flux, Unc_PL_Flux	ph $cm^{-2}s^{-1}$	The photon flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PowerLaw` model.
PL_EFlux, Unc_PL_EFlux	erg $cm^{-2}s^{-1}$	The energy flux integrated from 100 MeV to 100 GeV and associated error for the spectral fit using a `PowerLaw` model.

The OFF_PEAK extension (Table 4) contains the spatial and spectral results of the search for off-peak emission. The table contains one row for each pulsar. Details of this analysis are given in Section 7.2.

For sources reported with a PL spectral model, the differential spectrum is defined as:

$$\frac{dN}{dE} = \texttt{Prefactor\_OP} \left(\frac{E}{\texttt{Scale\_OP}} \right)^{-\texttt{Index\_OP}} . \tag{3}$$

The `Prefactor_OP`, `Index_OP`, and `Scale_OP` are given in the OFF_PEAK extension.

For sources reported with a PLEC1 spectral model (`PLSuperExpCutoff`), the differential spectrum is defined as:

$$\frac{dN}{dE} = \texttt{Prefactor\_OP} \left(\frac{E}{\texttt{Scale\_OP}} \right)^{-\texttt{Index\_OP}} \exp\left(-\frac{E}{\texttt{Energy\_Cutoff\_OP}} \right) \tag{4}$$

and the `Prefactor_OP`, `Index_OP`, `Scale_OP`, and `Energy_Cutoff_OP` are given in the OFF_PEAK extension as described below.

For the Crab Nebula and Vela-X, we took the spectral shape and initial normalization from Buehler et al. (2012) and Grondin et al. (2013), respectively, and fit only a multiplicative offset (see Section 7.2). For these two sources, the differential spectrum was defined as:

$$\frac{dN}{dE} = \texttt{Normalization\_OP} \left. \frac{dN}{dE} \right|_{\text{file}} \tag{5}$$

and `Normalization_OP` is provided in the OFF_PEAK extension of the main pulsar catalog FITS file.

References used for pulsar distances and radio flux values have been assigned a number, and the number is reported in the PULSAR_CATALOG extension. The REFERENCES extension (Table 5) provides the full information for each reference.

Table 4. LAT 2^{nd} Pulsar Catalog FITS format: OFF_PEAK Extension

Name	Units	Description
PSR_Name	···	Pulsar name
Classification_OP	···	Off-peak emission class: `M` for magnetospheric ("pulsar-like"), `W` for possible PWN emission, and `U` for Unidentified. `L` is for sources with no significant off-peak emission.
Min_Phase_OP, Max_Phase_OP	···	The minimum and maximum phase that defines the off-peak interval.
Min_2_Phase_OP, Max_2_Phase_OP	···	For pulsars with two off-peak phase ranges, the minimum and maximum phase for the second off-peak interval.
TS_point_OP	···	The test statistic obtained at the best-fit position of the assumed point-like source. TS is computed at the best-fit position assuming a power-law spectral model (except for PSR J0534+2200 as is described in Section 7.2).
TS_ext_OP	···	The significance of any possible extension for the source.
TS_cutoff_OP	···	The significance of any spectral cutoff for a source detected in the off-peak region. (Computed at the pulsar's position)
TS_var_OP	···	The significance of variability in the off-pulse emission.
Spectral_Model_OP	···	For regions with a significant detection, this is the best spectral model selected by our analysis procedure described in Section 7.2. The possible spectral models are `PowerLaw`, `PLSuperExpCutoff`, and `FileFunction` and are consistent with naming convention in `gtlike`.
Flux_OP, Unc_Flux_OP	ph $cm^{-2}s^{-1}$	The best-fit photon flux and estimated statistical error. The flux is integrated from 100 MeV to 316 GeV.
EFlux_OP, Unc_EFlux_OP	erg $cm^{-2}s^{-1}$	The best-fit energy flux and estimated statistical error. The flux is integrated from 100 MeV to 316 GeV.
Prefactor_OP, Unc_Prefactor_OP	ph $cm^{-2}s^{-1}MeV^{-1}$	The best-fit prefactor and estimated statistical error for the `PowerLaw` and `PLSuperExpCutoff` spectral models. The prefactor is defined in Eq. 3 and Eq. 4 for the two spectral models.
Normalization_OP, Unc_Normalization_OP	···	The best-fit normalization and estimated statistical error for `FileFunction` spectral models. The normalization is defined in Eq. 5. This spectral model was only used for the Crab Nebula and Vela-X.
Scale_OP	MeV	The scaling energy for the `PowerLaw` and `PLSuperExpCutoff` spectral models. The scale is defined in Eq. 3 and Eq. 4.
Index_OP, Unc_Index_OP	···	The best-fit photon index and estimated statistical error for the `PowerLaw` and `PLSuperExpCutoff` spectral models. The photon index is defined in Eq. 3 and Eq. 4 for the two spectral models.
Energy_Cutoff_OP, Unc_Energy_Cutoff_OP	MeV	The best-fit cutoff energy and the estimated statistical error for the `PLSuperExpCutoff` spectral model. It is defined in Eq. 4.
Spatial_Model_OP	···	For off-peak regions with a significant detection, the spatial model selected by our analysis procedure described in Section 7.2. The choices are `At_Pulsar`, `Point`, and `Extended`.
RAJ2000_OP, DEJ2000_OP	deg	The position of the source in celestial coordinates. For upper limits and sources with a best-fit spatial model at the pulsar position, this is the pulsar's position. For sources where the localized position is the selected spatial model, this is the best-fit position. For spatially-extended sources, this is the center of the best-fit extended source spatial model.
GLON_OP, GLAT_OP	deg	The same as `RA_J2000` and `DEC_J2000`, but in Galactic coordinates.
Unc_Position_OP	deg	For sources with a `Point` spatial model, the statistical error on the source localization. For sources with an `Extended` spatial model, the statistical error on the center of the extended source.
Extension_OP, Unc_Extension_OP	deg	For sources with an `Extended` spatial model, the best fit extension and estimated statistical error.
PowerLaw_Flux_UL_OP	ph $cm^{-2}s^{-1}$	For regions with no significant detection, this is the 95% confidence-level photon flux upper limit computed assuming a `PowerLaw` spectral model with `Index` = 2 and integrated from 100 MeV to 316 GeV.

Table 4—Continued

Name	Units	Description
PowerLaw_EFlux_UL_OP	erg $cm^{-2}s^{-1}$	The same as `PowerLaw_Flux_UL`, but instead the energy flux integrated from 100 MeV to 316 GeV.
Cutoff_Flux_UL_OP	ph $cm^{-2}s^{-1}$	For regions with no significant detection, the 95% confidence-level photon flux upper limit, integrated from 100 MeV to 316 GeV, assuming a `PLSuperExpCutoff` spectral model with `Index` = 1.7 and `Energy_Cutoff` = 3.
Cutoff_EFlux_UL_OP	erg $cm^{-2}s^{-1}$	The same as `Cutoff_Flux_UL`, but the energy flux instead of the photon flux.
SED_Lower_Energy_OP, SED_Upper_Energy_OP, SED_Center_Energy_OP	MeV	For each region, we computed a Spectral Energy Distribution (SED) for the source in 14 energy bins spaced uniformly from 100 MeV to 316 GeV (4 bins per energy decade). Therefore, each `SED_*` column corresponds to a vector of 14 values, one for each energy bin. `SED_Lower_Energy`, `SED_Upper_Energy`, and `SED_Middle_Energy` are the lower energy, upper energy, and energy in the geometric mean of the energy bin for each SED point.
SED_TS_OP	···	The test statistic obtained for each SED point.
SED_Prefactor_OP, Neg_Unc_SED_Prefactor_OP, Pos_Unc_SED_Prefactor_OP, SED_Prefactor_UL_OP	ph $cm^{-2}s^{-1}MeV^{-1}$	The best-fit prefactor, asymmetric lower and upper error, and 95% confidence-level upper limit computed for the source in each energy bin. When $TS \geq 25$, a detection is quoted when `SED_TS` > 4 and an upper limit is quoted otherwise. When $TS < 25$, all SED points are quoted as upper limits.

Table 5. LAT 2^{nd} Pulsar Catalog FITS format: REFERENCES Extension

Name	Units	Description
Ref_Number	···	Numerical value of the reference from Distance_Ref and S1400_Ref columns.
Citation	···	Citation for each reference.
ADS_URL	···	URL for the reference at the Astrophysical Data Service (ADS). This webpage provides links to the original publishing journal of the referenced paper, article, or catalog.
Title	···	Title of the reference.

1.2. Individual pulsar FITS files

In addition to the summary information for each pulsar contained in the main catalog file, detailed results of the analyses are provided in the individual pulsar FITS files. Each file contains a variable number of FITS table extensions: PULSAR_SED, MODEL_SED, GAMMA_LC, BEST_FIT_LC, and RADIO_PROFILE (for radio detected pulsars). Again, the primary extension is empty. These files are also provided in ascii format with the content of the FITS tables appended in the order listed above.

The PULSAR_SED extension (Table 6) contains the photon and energy fluxes for each pulsar in either six or twelve energy bins, fitting the pulsar with a power-law spectral form. These points correspond to the black data points in the pulsar SED image files. The number of energy bins used in the SED varies with the significance of the pulsar. In a few cases, the pulsar is too faint to construct an SED or there were problems with the spectral fit, and this extension is not included.

The MODEL_SED extension (Table 7) contains the model photon flux and bowtie uncertainty using the PLEC1 spectral form fitted over the full energy range. A description of the spectral fitting method is provided in Section 6.1. These points correspond to the red curves in the pulsar SED image files. In cases where the pulsar is too faint to construct an SED, this extension is not reported.

The GAMMA_LC extension (Table 8) contains weighted counts and the corresponding uncertainties for light curves in six different energy ranges. The number of points in each light curve varies with the significance of the pulsar. These points correspond to the light curves shown in black in the pulsar light curve image files. The values for the background shown in those images are provided as keywords in the header of this FITS extension.

The BEST_FIT_LC extension (Table 9) reports the fitted light curve that best represents the data, as described in Section 5. These points correspond to the blue curves shown in the pulsar light curve image files.

The RADIO_PROFILE extension (Table 10) reports the radio profile for the radio loud pulsars. These points correspond to the red curves shown in the pulsar light curve image files. This extension is not included for pulsars undetected in radio.

Table 6. LAT 2^{nd} Individual Pulsar FITS file format: PULSAR_SED Extension

Name	Units	Description
Energy_Min, Energy_Max	GeV	Lower and upper bounds for each SED bin.
Center_Energy	GeV	Central energy for each SED bin.
PhotonFlux	ph $cm^{-2}s^{-1}$	Photon flux in bin
Unc_PhotonFlux	ph $cm^{-2}s^{-1}$	Best-fit value and associated error for the photon flux in each SED bin using a power law spectral model. The error is set to zero when the given photon flux is an upper limit.
EnergyFlux, Unc_EnergyFlux	erg $cm^{-2}s^{-1}$	Best-fit value and associated error for the energy flux in each SED bin using a power law spectral model. The error is set to zero when the given energy flux is an upper limit.

Table 7. LAT 2^{nd} Individual Pulsar FITS file format: MODEL_SED Extension

Name	Units	Description
Energy_Min, Energy_Max	GeV	Lower and upper bounds for each SED bin.
Center_Energy	GeV	Central energy for each SED bin.
Model_PhotonFlux	ph $cm^{-2}s^{-1}$	Integrated photon flux in each bin calculated from the `PLSuperExpCutoff` model with the exponential index fixed at a value of 1 that has been fitted over the full energy range (from 100 MeV to 100 GeV).
Bowtie_Flux	ph $cm^{-2}s^{-1}$	One-sigma uncertainty on the Model_PhotonFlux used to construct the bowtie on the spectral plots.

Table 8. LAT 2^{nd} Individual Pulsar FITS file format: GAMMA_LC Extension

Name	Units	Description
Phase_Min, Phase_Max	···	Lower and upper bounds for each bin in the gamma-ray light curve.
GT100_WtCounts, Unc_GT100_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 100 MeV to 100 GeV.
GT3000_WtCounts, Unc_GT3000_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 3 GeV to 100 GeV.
GT10000_WtCounts, Unc_GT10000_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 10 GeV to 100 GeV.
100_300_WtCounts, Unc_100_300_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 100 MeV to 300 MeV.
300_1000_WtCounts, Unc_300_1000_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 300 MeV to 1 GeV.
1000_3000_WtCounts, Unc_1000_3000_WtCounts	···	Weighted counts and associated error in each phase bin for the gamma-ray light curve using an energy range of 1 to 3 GeV.

Table 9. LAT 2^{nd} Individual Pulsar FITS file format: BEST_FIT_LC Extension

Name	Units	Description
Phase_Min, Phase_Max	···	Lower and upper bounds for each bin in the best fit gamma-ray light curve.
Norm_Intensity	···	Normalized gamma-ray intensity for each bin in the best fit gamma-ray light curve. The intensity is normalized so that the integral of the profile is ~ 1 (i.e. normalized as a density function).

Table 10. LAT 2^{nd} Individual Pulsar FITS file format: RADIO_PROFILE Extension

Name	Units	Description
Phase_Min, Phase_Max	···	Lower and upper bounds for each bin in the radio light curve.
Norm_Intensity	···	Normalized radio flux for each bin in the radio light curve. The flux is normalized so that the peak flux equals 1.

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