J/A+A/612/A6 RX J1713.7-3946 HESS spectrum (HESS+, 2018)

H.E.S.S. observations of RX J1713.7-3946 with improved angular and spectral resolution: Evidence for gamma-ray emission extending beyond the X-ray emitting shell.

H.E.S.S. Collaboration, Abdalla H., Abramowski A., Aharonian F., Ait Benkhali F., Akhperjanian A.G., Andersson T., Anguner E.O., Arrieta M., Aubert P., Backes M., Balzer A., Barnard M., Becherini Y., Becker Tjus J., Berge D., Bernhard S., Bernlohr K., Blackwell R., Bottcher M., Boisson C., Bolmont J., Bordas P., Bregeon J., Brun F., Brun P., Bryan M., Bulik T., Capasso M., Carr J., Casanova S., Cerruti M., Chakraborty N., Chalme-Calvet R., Chaves R.C.G., Chen A., Chevalier J., Chretien M., Colafrancesco S., Cologna G., Condon B., Conrad J., Cui Y., Davids I.D., Decock J., Degrange B., Deil C., Devin J., deWilt P., Dirson L., Djannati-Ata A., Domainko W., Donath A., Drury L.O'C., Dubus G., Dutson K., Dyks J., Edwards T., Egberts K., Eger P., Ernenwein J.-P., Eschbach S., Farnier C., Fegan S., Fernandes M.V., Fiasson A., Fontaine G., Forster A., Fukuyama T., Funk S., Fussling M., Gabici S., Gajdus M., Gallant Y.A., Garrigoux T., Giavitto G., Giebels B., Glicenstein J.F., Gottschall D., Goyal A., Grondin M.-H., Hadasch D., Hahn J., Haupt M., Hawkes J., Heinzelmann G., Henri G., Hermann G., Hervet O., Hinton J.A., Hofmann W., Hoischen C., Holler M., Horns D., Ivascenko A., Jacholkowska A., Jamrozy M., Janiak M., Jankowsky D., Jankowsky F., Jingo M., Jogler T., Jouvin L., Jung-Richardt I., Kastendieck M.A., Katarzynski K., Katz U., Kerszberg D., Khelifi B., Kieffer M., King J., Klepser S., Klochkov D., Kluzniak W., Kolitzus D., Komin Nu., Kosack K., Krakau S., Kraus M., Krayzel F., Kruger P.P., Laffon H., Lamanna G., Lau J., Lees J.-P., Lefaucheur J., Lefranc V., Lemiere A., Lemoine-Goumard M., Lenain J.-P., Leser E., Lohse T., Lorentz M., Liu R., Lopez-Coto R., Lypova I., Marandon V., Marcowith A., Mariaud C., Marx R., Maurin G., Maxted N., Mayer M., Meintjes P.J., Meyer M., Mitchell A.M.W., Moderski R., Mohamed M., Mohrmann L., Mora K., Moulin E., Murach T., de Naurois M., Niederwanger F., Niemiec J., Oakes L., O'Brien P., Odaka H., O ttl S., Ohm S., Ostrowski M., Oya I., Padovani M., Panter M., Parsons R.D., Pekeur N.W., Pelletier G., Perennes C., Petrucci P.-O., Peyaud B., Piel Q., Pita S., Poon H., Prokhorov D., Prokoph H., Puhlhofer G., Punch M., Quirrenbach A., Raab S., Reimer A., Reimer O., Renaud M., de los Reyes R., Rieger F., Romoli C., Rosier-Lees S., Rowell G., Rudak B., Rulten C.B., Sahakian V., Salek D., Sanchez D.A., Santangelo A., Sasaki M., Schlickeiser R., Schussler F., Schulz A., Schwanke U., Schwemmer S., Settimo M., Seyffert A.S., Shafi N., Shilon I., Simoni R., Sol H., Spanier F., Spengler G., Spies F., Stawarz L., Steenkamp R., Stegmann C., Stinzingy F., Stycz K., Sushch I., Takahashi T., Tavernet J.-P., Tavernier T., Taylor A.M., Terrier R., Tibaldo L., Tiziani D., Tluczykont M., Trichard C., Tu R., Uchiyama Y., van der Walt D.J., van Eldik C., van Rensburg C., van Soelen B., Vasileiadis G., Veh J., Venter C., Viana A., Vincent P., Vink J., Voisin F., Volk H.J., Volpe F., Vuillaume T., Wadiasingh Z., Wagner S.J., Wagner P., Wagner R.M., White R., Wierzcholska A., Willmann P., Wornlein A., Wouters D., Yang R., Zabalza V., Zaborov D., Zacharias M., Zdziarski A.A., Zech A., Zefi F., Ziegler A., Zywucka N.

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ADC_Keywords: Gamma rays - Supernova remnants

Keywords: acceleration of particles - cosmic rays - ISM: supernova remnants - gamma rays: general - astroparticle physics

Abstract:

Supernova remnants exhibit shock fronts (shells) that can accelerate charged particles up to very high energies. In the past decade, measurements of a handful of shell-type supernova remnants in very high-energy gamma rays have provided unique insights into the acceleration process. Among those objects, RX J1713.7-3946 (also known as G347.3-0.5) has the largest surface brightness, allowing us in the past to perform the most comprehensive study of morphology and spatially resolved spectra of any such very high-energy gamma-ray source. Here we present extensive new H.E.S.S. measurements of RX J1713.7-3946, almost doubling the observation time compared to our previous publication. Combined with new improved analysis tools, the previous sensitivity is more than doubled. The H.E.S.S. angular resolution of 0.048° (0.036° above 2TeV) is unprecedented in gamma-ray astronomy and probes physical scales of 0.8 (0.6) parsec at the remnant's location. The new H.E.S.S. image of RX J1713.7-3946 allows us to reveal clear morphological differences between X-rays and gamma rays. In particular, for the outer edge of the brightest shell region, we find the first ever indication for particles in the process of leaving the acceleration shock region. By studying the broadband energy spectrum, we furthermore extract properties of the parent particle populations, providing new input to the discussion of the leptonic or hadronic nature of the gamma-ray emission mechanism.

Description:

FITS files with the very high-energy gamma-ray images, Fig.1, and the spectrum, Fig.3, as ascii text file.

Objects:

RA (2000)	DE	Designation(s)

17 12 27 -39 41.2 RX J1713.7-3946 = HESS J1713-397

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
spectrum.dat	14	30	H.E.S.S. energy flux spectrum of RX J1713.7-3946 (Fig.3 of the paper)
list.dat	109	2	List of fits images
fits/*	0	2	Individual fits images

See also:

J/A+A/612/A1 : H.E.S.S. Galactic Plane Survey (HESS+, 2018)
J/A+A/612/A5 : W49B with H.E.S.S. and Fermi-LAT (HESS+, 2018)
J/A+A/612/A7 : Vela Junior (RX J0852.0-4622) HESS image (HESS+, 2018)

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

Bytes	Format	Units	Label	Explanations
1- 5	F5.2	TeV	E	Energy
7- 14	E8.3	mW/m2	E2dN/dE	Flux

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

Bytes	Format	Units	Label	Explanations
1- 9	F9.5	deg	RAdeg	Right Ascension of center (J2000)
10- 18	F9.5	deg	DEdeg	Declination of center (J2000)
20- 21	I2	arcsec/pix	scale	Scale of the image
23- 25	I3	---	Nx	Number of pixels along X-axis
27- 29	I3	---	Ny	Number of pixels along Y-axis
31- 33	I3	Kibyte	size	Size of FITS file
35- 49	A15	---	FileName	Name of FITS file, in subdirectory fits
51-109	A59	---	Title	Title of the FITS file

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HESS collaboration, Paper IV 2018A&A...612A...4H
HESS collaboration, Paper V 2018A&A...612A...5H, Cat. J/A+A/612/A5
HESS collaboration, Paper VI 2018A&A...612A...6H, Cat. J/A+A/612/A6
HESS collaboration, Paper VII 2018A&A...612A...7H, Cat. J/A+A/612/A7
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HESS collaboration, Paper XII 2018A&A...612A..12H
HESS collaboration, Paper XIII 2018A&A...612A..13H
MAGIC collaboration, Paper XIV 2018A&A...612A..14M

(End) Patricia Vannier [CDS] 10-Feb-2017

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