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Supplementary information

Thermonuclear explosions on neutron stars reveal the speed of their jets

In the format provided by the authors and unedited

Supplementary Information: Table 1. Time resolved spectroscopy of the 4U1636 X-ray bursts. For each burst, spectra were extracted in five time bins.

Burst	Start (MJD)	Stop (MJD)	Exp. (sec)	$kT_{\rm bb}$ (keV)	$R^2_{\rm km}/D^2_{10}$	Flux $\times 10^{-8}$ (erg/cm^2/s)	χ^2/d.o.f.
B1	59,491.256215	59,491.256261	3.20	$1.9^{+0.7}_{-0.6}$	165^{+71}_{-71}	2^{+1}_{-1}	1.28/3
	59,491.256261	59,491.256307	3.19	$1.9^{+1.0}_{-0.8}$	167^{+86}_{-86}	2^{+2}_{-2}	1.98/3
	59,491.256307	59,491.256400	6.39	$1.8^{+0.8}_{-0.7}$	171^{+68}_{-68}	$1.7^{+0.7}_{-0.7}$	0.31/3
	59,491.256400	59,491.256585	12.88	$1.9^{+1.7}_{-1.0}$	34^{+20}_{-20}	$0.5^{+1.3}_{-0.2}$	0.42/3
	59,491.256585	59,491.256956	25.77	$1.8^{+1.3}_{-0.8}$	34^{+18}_{-18}	$0.3^{+0.2}_{-0.2}$	1.26/3
	59,491.256956	59,491.257696	51.65	< 2.4	–	–	–
B2	59,491.450034	59,491.450081	3.19	$2.1^{+1.3}_{-0.8}$	116^{+49}_{-50}	2^{+1}_{-1}	0.85/3
	59,491.450081	59,491.450127	3.19	$1.9^{+1.0}_{-0.7}$	130^{+68}_{-68}	$1.5^{+8.9}_{-0.7}$	2.12/3
	59,491.450127	59,491.450219	6.40	$1.7^{+0.8}_{-0.6}$	140^{+62}_{-62}	$1.2^{+0.6}_{-0.6}$	0.56/3
	59,491.450219	59,491.450405	12.83	$1.7^{+0.7}_{-0.6}$	119^{+46}_{-46}	$0.9^{+0.3}_{-0.4}$	0.10/3
	59,491.450405	59,491.450775	25.73	$1.7^{+1.1}_{-0.7}$	35^{+20}_{-21}	$0.3^{+0.2}_{-0.2}$	1.03/3
	59,491.450775	59,491.451516	51.55	< 2.6	< 81	< 0.2	1.02/3
B3	59,491.791631	59,491.791678	3.19	$1.4^{+1.1}_{-0.7}$	433^{+208}_{-208}	2^{+1}_{-9}	0.69/3
	59,491.791678	59,491.791724	3.19	$1.3^{+1.3}_{-0.9}$	851^{+400}_{-399}	$2.1^{+1.3}_{0.9}$	2.23/3
	59,491.791724	59,491.791817	6.40	$1.6^{+0.7}_{-0.5}$	232^{+88}_{-89}	$1.7^{+0.6}_{-0.7}$	0.54/3
	59,491.791817	59,491.792002	12.86	$1.7^{+0.7}_{-0.6}$	101^{+42}_{-42}	$0.9^{+0.3}_{-0.4}$	0.55/3
	59,491.792002	59,491.792372	25.73	$1.6^{+0.9}_{-0.7}$	56^{+26}_{-27}	$0.4^{+0.2}_{-0.2}$	0.80/3
	59,491.792372	59,491.793113	51.55	< 6.4	< 2	< 0.2	1.12/3
B4	59,492.095034	59,492.095081	3.21	< 3	339^{+162}_{-162}	2^{+1}_{-1}	1.44/3
	59,492.095081	59,492.095127	3.21	$2.8^{+3.6}_{-1.2}$	36^{+18}_{-18}	2^{+2}_{-1}	0.13/3
	59,492.095127	59,492.095219	6.42	$2.1^{+1.7}_{-0.9}$	53^{+28}_{-28}	$1.2^{+0.7}_{-0.7}$	0.11/3
	59,492.095219	59,492.095405	12.87	$1.6^{+0.9}_{-0.7}$	115^{+53}_{-53}	$0.7^{+0.3}_{-0.3}$	0.34/3
	59,492.095405	59,492.095775	25.78	$1.8^{+1.7}_{-0.9}$	29^{+15}_{-16}	$0.3^{+0.2}_{-0.2}$	1.42/3
	59,492.095775	59,492.096516	51.65	< 4.1	< 11	< 0.2	0.57/3
B5	59,492.246238	59,492.246284	3.18	$1.9^{+0.7}_{-0.5}$	184^{+65}_{-66}	3^{+1}_{-1}	0.28/3
	59,492.246273	59,492.246319	3.17	$2.2^{+0.9}_{-0.7}$	109^{+40}_{-41}	5^{+1}_{-1}	0.53/3
	59,492.246319	59,492.246412	6.36	$1.8^{+0.6}_{-0.5}$	170^{+58}_{-58}	$1.7^{+0.7}_{-0.5}$	0.37/3
	59,492.246412	59,492.246597	12.80	$1.9^{+1.7}_{-0.9}$	49^{+22}_{-22}	$0.8^{+1.3}_{-0.3}$	1.36/3
	59,492.246597	59,492.246967	25.74	$1.5^{+0.9}_{-0.7}$	63^{+30}_{-31}	$0.3^{+0.1}_{-0.1}$	1.27/3
B6	59,492.399918	59,492.399965	3.20	$2.3^{+1.2}_{-0.8}$	103^{+41}_{-41}	3^{+1}_{-1}	0.56/3
	59,492.399965	59,492.400011	3.20	$1.2^{+1.2}_{-0.6}$	875^{+404}_{-403}	$2.9^{+1.9}_{-0.9}$	1.83/3
	59,492.400011	59,492.400104	6.39	$2.3^{+1.7}_{-0.9}$	40^{+20}_{-20}	$1.2^{+1.7}_{-0.6}$	0.58/3
	59,492.400104	59,492.400289	12.83	$1.6^{+1.1}_{-0.9}$	85^{+40}_{-40}	$0.6^{+1.3}_{-0.3}$	0.44/3
	59,492.400289	59,492.400659	25.75	$1.6^{+1.0}_{-0.7}$	44^{+23}_{-23}	$0.3^{+0.2}_{-0.2}$	1.01/3
	59,492.400659	59,492.401400	51.57	< 3	448^{+277}_{-276}	$0.2^{+1.0}_{-0.1}$	1.41/3
B7	59,492.550995	59,492.551041	3.18	$2.9^{+2.0}_{-1.0}$	34^{+14}_{-14}	3^{+1}_{-1}	0.38/3
	59,492.551041	59,492.551087	3.18	$2.0^{+0.9}_{-0.7}$	115^{+45}_{-45}	$2.1^{+0.9}_{-0.9}$	0.36/3
	59,492.551087	59,492.551180	6.39	$1.9^{+1.0}_{-0.7}$	80^{+37}_{-37}	$1.0^{+1.5}_{-0.5}$	0.64/3
	59,492.551180	59,492.551365	12.79	$1.7^{+0.7}_{-0.6}$	75^{+27}_{-27}	$0.8^{+0.2}_{-0.3}$	0.49/3
	59,492.551365	59,492.551736	25.70	$1.3^{+2.3}_{-0.9}$	68^{+45}_{-46}	$0.2^{+0.5}_{-0.1}$	1.07/3
	59,492.551736	59,492.552476	51.38	< 0.8	–	–	–
B8	59,492.700995	59,492.701041	3.19	$1.9^{+0.9}_{-0.6}$	131^{+56}_{-56}	2^{+8}_{-1}	2.49/3
	59,492.701041	59,492.701087	3.19	$1.8^{+0.7}_{-0.6}$	196^{+79}_{-80}	$2.1^{+1.0}_{-0.9}$	0.96/3
‘	59,492.701087	59,492.701180	6.39	$2.2^{+1.0}_{-0.7}$	70^{+23}_{-23}	$1.9^{+1.7}_{-0.6}$	0.43/3
	59,492.701180	59,492.701365	12.83	$1.2^{+0.6}_{-0.5}$	420^{+171}_{-171}	$0.8^{+0.5}_{-0.4}$	1.38/3

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Supplementary Information: Table 1 – continued from previous page

Burst	Start (MJD)	Stop (MJD)	Exp. (sec)	$kT_{\rm bb}$ (keV)	$R^2_{\rm km}/D^2_{10}$	Flux $\times 10^{-8}$ (erg/cm^2/s)	χ^2/d.o.f.
	59,492.701365	59,492.701736	25.70	$1.0^{+1.0}_{-1.0}$	292^{+146}_{-146}	$0.3^{+0.8}_{-0.2}$	2.33/3
	59,492.701736	59,492.702476	51.50	< 3.5	40^{+27}_{-28}	$0.8^{+0.1}_{-0.1}$	0.98/3
B9	59,492.887604	59,492.887650	3.18	$1.6^{+0.6}_{-0.5}$	330^{+117}_{-117}	2^{+7}_{-1}	0.66/3
	59,492.887650	59,492.887696	3.17	$1.9^{+0.6}_{-0.5}$	207^{+61}_{-61}	$3.0^{+0.9}_{-1}$	0.51/3
	59,492.887696	59,492.887789	6.35	$2.3^{+1.2}_{-0.8}$	52^{+17}_{-18}	$1.5^{+1.7}_{-0.5}$	1.15/3
	59,492.887789	59,492.887974	12.80	$1.4^{+0.7}_{-0.4}$	182^{+62}_{-62}	$0.8^{+0.2}_{-0.3}$	2.02/3
	59,492.887974	59,492.888344	25.69	$1.4^{+0.8}_{-0.6}$	108^{+44}_{-44}	$0.4^{+0.2}_{-0.2}$	0.42/3
	59,492.888344	59,492.889085	51.42	$1.2^{+1.1}_{-1.2}$	58^{+36}_{-36}	$0.11^{+0.11}_{-0.07}$	0.08/3
B10	59,493.035509	59,493.035555	3.18	$1.8^{+0.8}_{-0.6}$	241^{+89}_{-89}	3^{+1}_{-1}	0.51/3
	59,493.035555	59,493.035601	3.17	$2.0^{+1.3}_{-0.7}$	133^{+53}_{-53}	$2.2^{+0.9}_{-0.9}$	2.72/3
	59,493.035601	59,493.035694	6.38	$1.9^{+0.8}_{-0.7}$	96^{+38}_{-38}	$1.2^{+0.5}_{-0.4}$	1.19/3
	59,493.035694	59,493.035879	12.84	$1.6^{+0.9}_{-0.7}$	59^{+31}_{-31}	$0.4^{+0.2}_{-0.2}$	1.44/3
	59,493.035879	59,493.036250	25.72	< 2.9	66^{+32}_{-32}	$0.3^{+0.1}_{-0.1}$	1.81/3
	59,493.036250	59,493.036990	51.46	< 2	145^{+87}_{-87}	$0.21^{+0.21}_{-0.09}$	0.69/3
B11	59,493.183449	59,493.183495	3.21	$2.0^{+0.7}_{-0.5}$	164^{+64}_{-64}	3^{+1}_{-1}	1.61/3
	59,493.183495	59,493.183541	3.18	$2.6^{+3.7}_{-2.6}$	34^{+19}_{-20}	3^{+1}_{-1}	1.76/3
	59,493.183541	59,493.183634	6.38	$1.9^{+1.0}_{-0.7}$	77^{+36}_{-37}	$1.1^{+1.5}_{-0.5}$	0.43/3
	59,493.183634	59,493.183819	12.83	$1.8^{+1.3}_{-0.8}$	62^{+27}_{-27}	$0.6^{+0.3}_{-0.3}$	0.77/3
	59,493.183819	59,493.184189	25.71	< 2.5	98^{+48}_{-48}	$0.3^{+0.2}_{-0.2}$	0.62/3
	59,493.184189	59,493.184930	51.51	< 1.8	1653^{+1311}_{-1306}	$0.22^{+0.22}_{-0.10}$	0.29/3
B12	59,493.334872	59,493.334918	3.19	$2.8^{+9.3}_{-2.8}$	22^{+13}_{-15}	10^{+7}_{-9}	0.97/3
	59,493.334918	59,493.334965	3.19	$2.0^{+1.5}_{-0.9}$	158^{+62}_{-63}	4^{+1}_{-2}	2.22/3
	59,493.334965	59,493.335057	6.37	$1.8^{+0.7}_{-0.6}$	167^{+58}_{-58}	$2.0^{+0.7}_{-0.6}$	1.64/3
	59,493.335057	59,493.335243	12.83	$1.7^{+1.0}_{-0.7}$	95^{+39}_{-39}	$0.7^{+0.3}_{-0.3}$	0.68/3
	59,493.335243	59,493.335613	25.70	$1.9^{+1.8}_{-0.9}$	22^{+11}_{-11}	$0.3^{+0.2}_{-0.2}$	0.51/3
	59,493.335613	59,493.336354	51.46	< 3.9	46^{+41}_{-41}	$0.10^{+0.1}_{-0.09}$	1.18/3