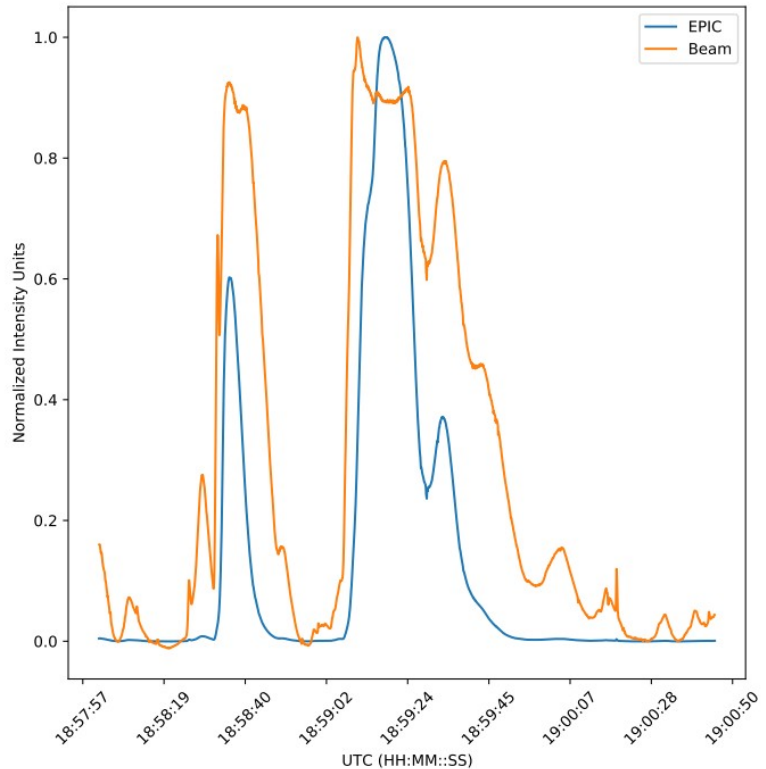
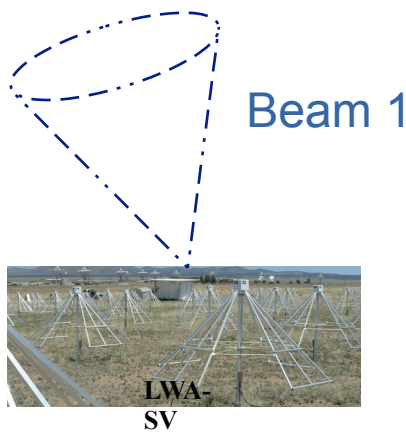
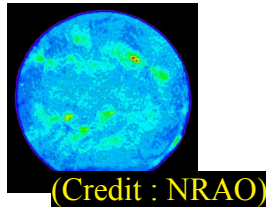


**Comparison of EPIC and beam-formed data from LWA-SV****Hariharan Krishnan**  
**November, 2021**

Simultaneous EPIC and beam-formed observations of the Sun were carried out on 2021, August, 28 at the LWA-SV. Using the EPIC images, dynamic spectra was extracted using the image pixels corresponding to Sun's location. We also obtain solar dynamic spectra using the real-time DR spectrometer mode. Refer Table 1 for specs of the dynamic spectra.

**Table 1 : Specifications of the Dynamic Spectra**

	<b>EPIC</b>	<b>Beam-formed</b>
Bandwidth (MHz)	1.8	19.6
Time Resolution (ms)	81.92	80
Frequency Resolution (kHz)	25	19.141
Number of Channels	72	1024



*Figure 1: Normalized light-curve of band-integrated light curves for EPIC and Beam data.*

The band-integrated light-curve of a strong type III radio burst recorded that was recorded around 18:59 UT with the beam observations was compared with that from the EPIC data. Note that for the beam data only the bandwidth corresponding to EPIC was used. We notice the shape of the band-integrated intensity profile of the bright radio bursts look very different. Apparently, the beam light curve displayed details of finer structure as compared with the dynamic spectrum (Refer Fig. 1) . This was further investigated and we find that the beam data has been clipped at certain sections upto 12 % due to saturation as shown below. This is attributed to the dynamic range limitation arising from the bit-depth (8-bits) used in data representation of the power spectrum output of DR Spectrometer.

	Clipping					Power			
	1X	1Y	2X	2Y		1I	1V	2I	2V
1	0.00%	0.00%	0.00%	0.00%		7.61	0.02	4.40	0.06
2	2.23%	2.19%	0.01%	0.04%		24.12	0.42	10.80	-0.05
3	0.90%	0.94%	0.01%	0.05%		19.70	0.38	10.63	0.05
4	12.72%	12.56%	0.01%	0.05%		41.98	0.84	10.86	0.13
5	1.60%	1.68%	0.01%	0.05%		22.31	0.60	10.68	0.17
6	2.00%	2.11%	0.03%	0.07%		23.50	1.15	10.78	0.17
7	8.19%	8.19%	0.01%	0.05%		35.63	3.86	10.95	0.23
8	0.93%	0.94%	0.03%	0.06%		19.71	0.43	10.92	0.25
9	0.78%	0.73%	0.01%	0.02%		18.90	0.29	10.26	0.19
-----									
M	3.26%	3.26%	0.01%	0.04%		23.72	0.89	10.03	0.13

Although the overall data clipped is only 3 %, it seems that the bright bursts have indeed been clipped due to this effect. This is clear on inspection of the low intensity regions of the profile where fine features of the beam and EPIC data match quite well (Figure 2). However it can be seen that the intensity values are at slightly different scale with an offset which makes it hard to compare.

To estimate and correct for the scale/offset, we identified the unsaturated portion of this data in the range between 18:58 and 18:58:30 that has no clipping effects. The estimated scale difference was then applied to the beam data and Figure 4 shows the comparison. Figure 4 clearly shows that the two profiles are well-matched.

The scale/offset estimation is further performed at multiple such regions in the dataset and a mean correction is estimated. This mean is then applied to the rest of the data and the comparison of the corrected burst profile is shown in Figure 5. It can be seen that the curves do not exactly overlay which may be due to the fact that the beam records the Stokes I and V dynamic spectra while the EPIC images only a single polarization <XX\*>. Addressing the polarization match and the gain settings for the beam observations should take care of these issues.

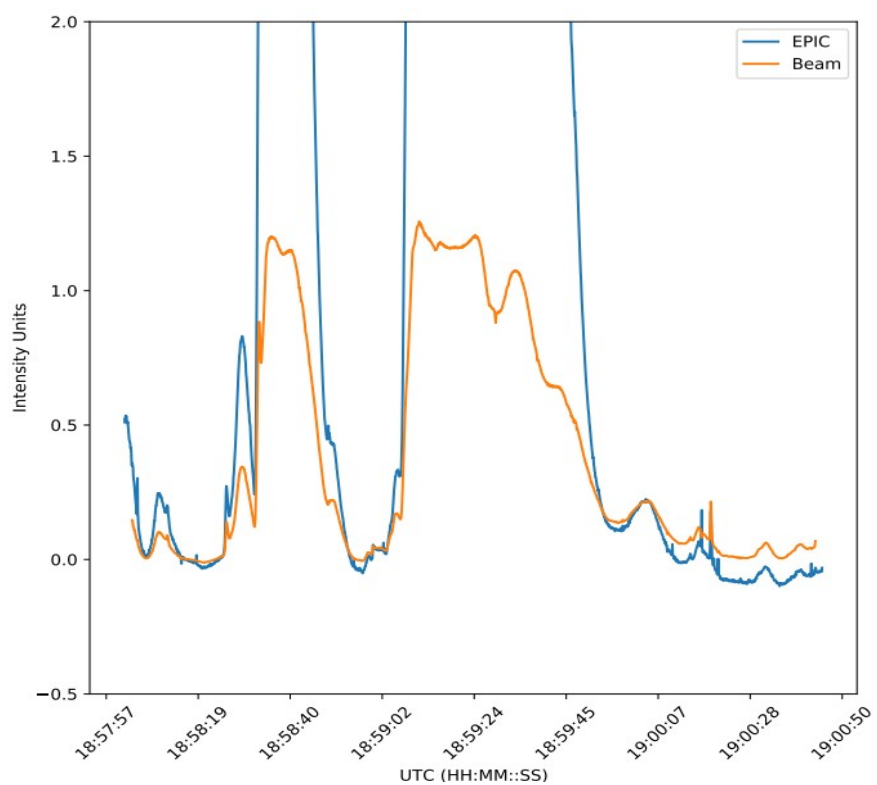


Figure 2: Zoomed Image showing a comparison of the low intensity features in the profiles

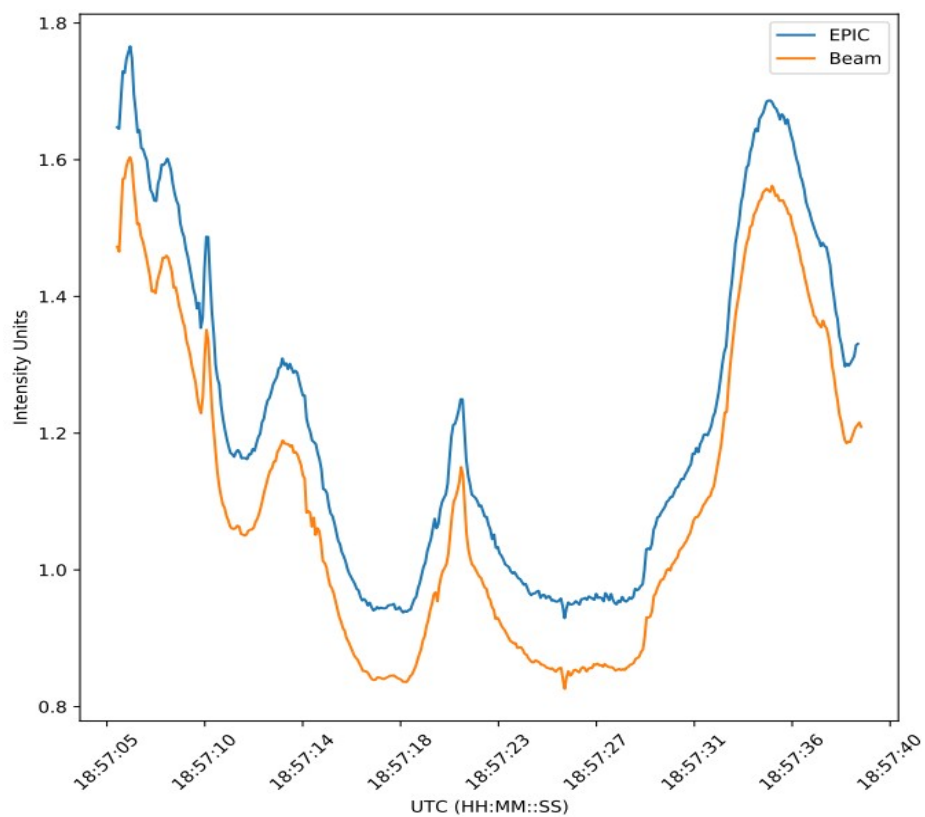


Figure 3: Section of Data for Offset/Scale Correction

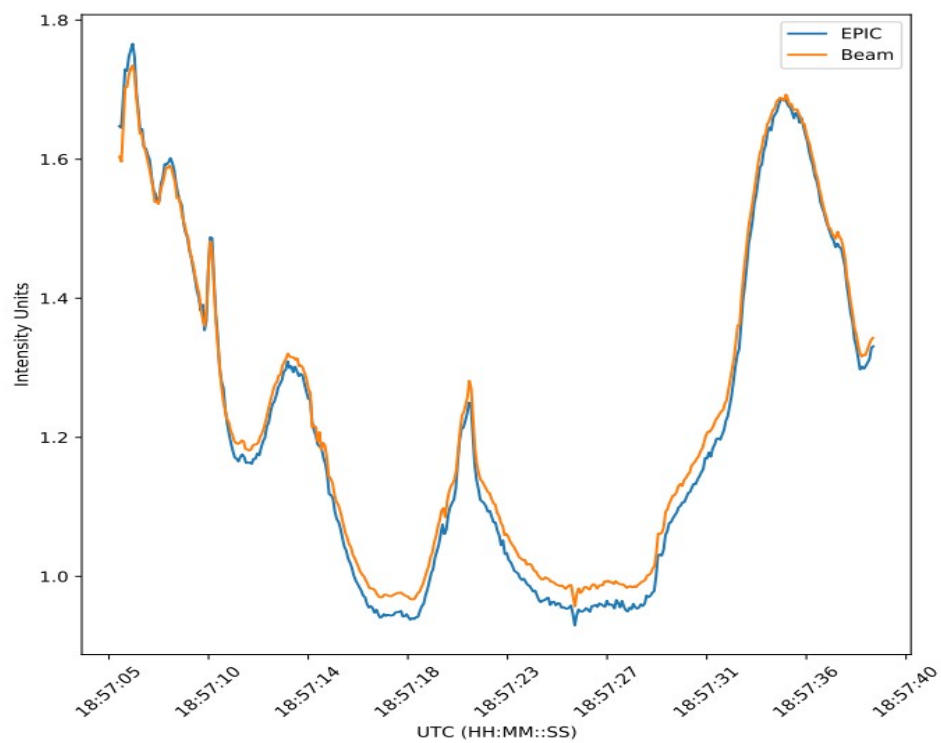


Figure 4: Offset/Scale Corrected light-cure comparison

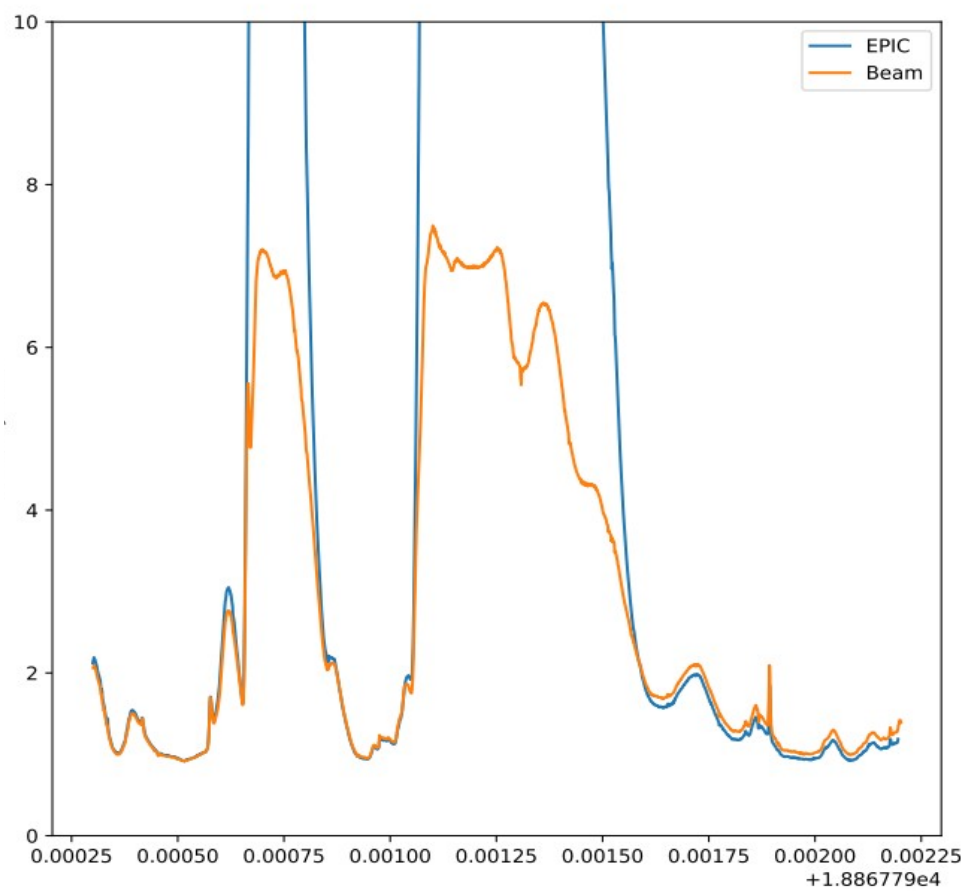


Figure 5: Scale corrected rado burst profile comparison