Iron K-shell l line:a probe of low energy cosmic rays in SNRs

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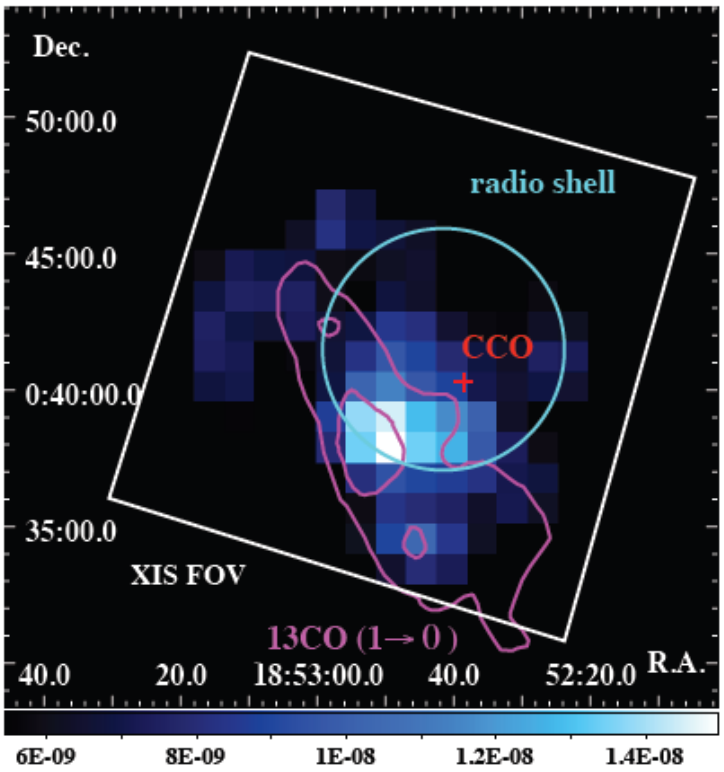
Since the discovery of non thermal power-law X-rays at the rim of SN1006 by Koyama et al. (1995), this feature has been established to be evidence of high energy cosmic rays (HECRs). The HECRs are created by a diffuse shock acceleration process. Accordingly low energy cosmic rays (LECRS) must be presented as the injector of this acceleration process. We found for the first time that the K-shell line from neutral iron at 6.4 keV is good tracer of LECRs in SNRs. This paper present the observational facts for LECRs from intermediate aged SNRs, 3C391, Kes79, Kes 78 and W44 in the Scutum Arm region (see figure, Sato et al. 2014, 2015). Two SNRs, 3C391 and W44, exhibit recombining plasma (RP), an unusual structure in the frame work of the standard SNR evolution scenario. Together with the RP, we discuss the origin of LECRs in the SNRs.



Neutral iron K-shell line (6.4 keV) distribution of Kes79. The line is correlated to the molecular cloud at the southeast of the SNR