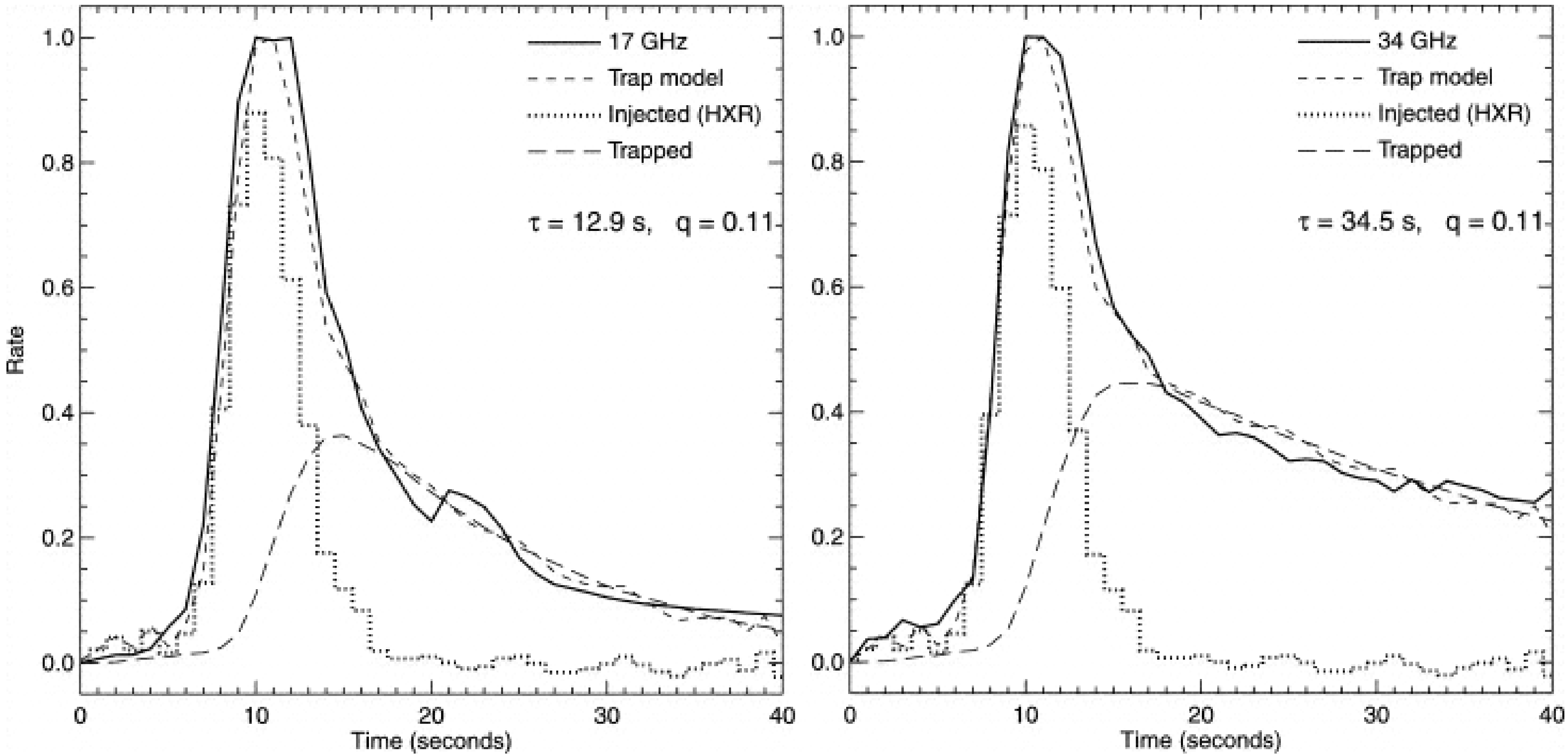
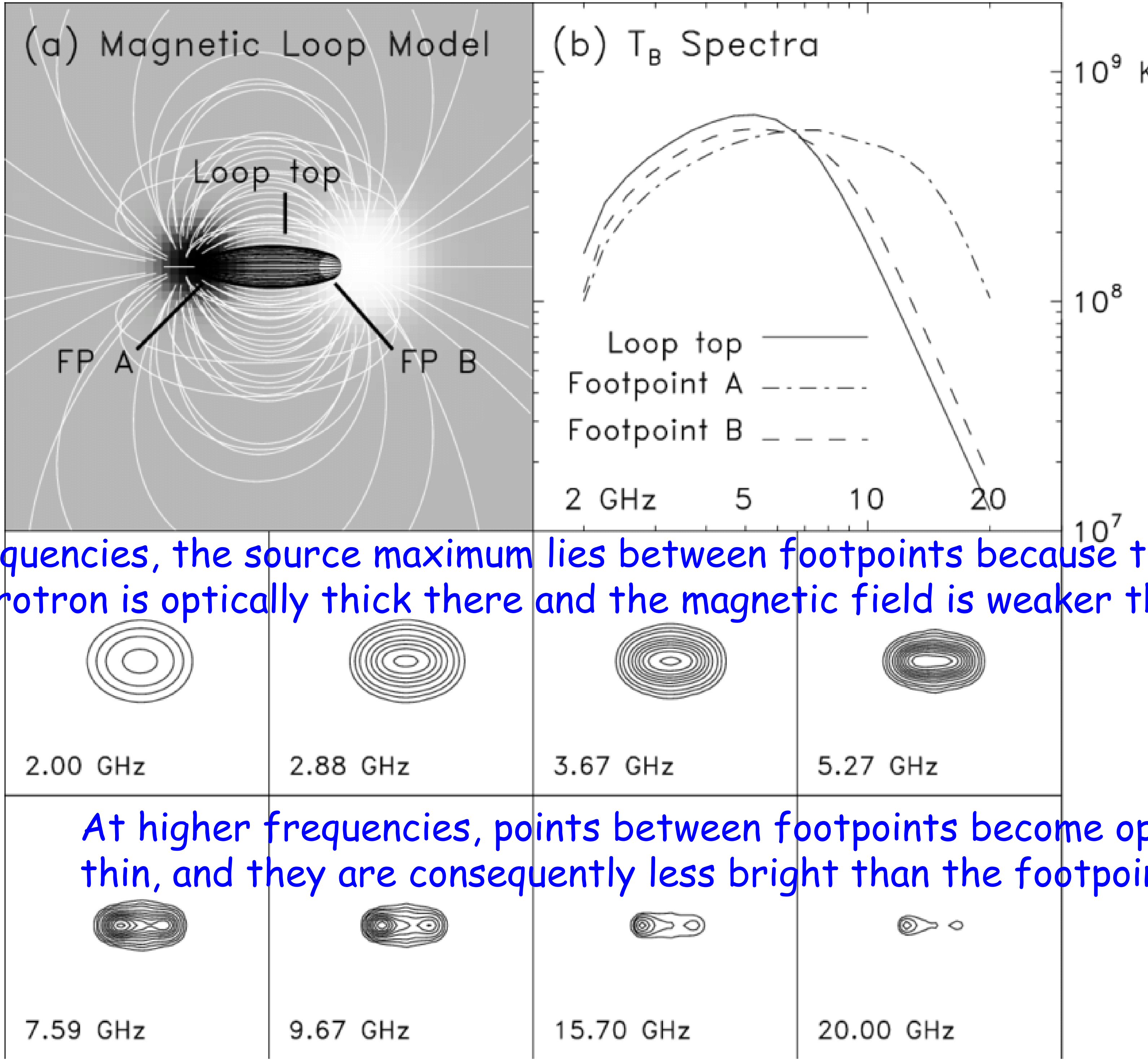
trap-plus-precipitation



→ Higher frequency emission results from higher energy electrons, which have a smaller collision frequency than those responsible for the 17 GHz emission.

→ The relative ratio of the radio flux produced by direct-precipitating and trap-precipitating electrons was also determined as q = 0.11.

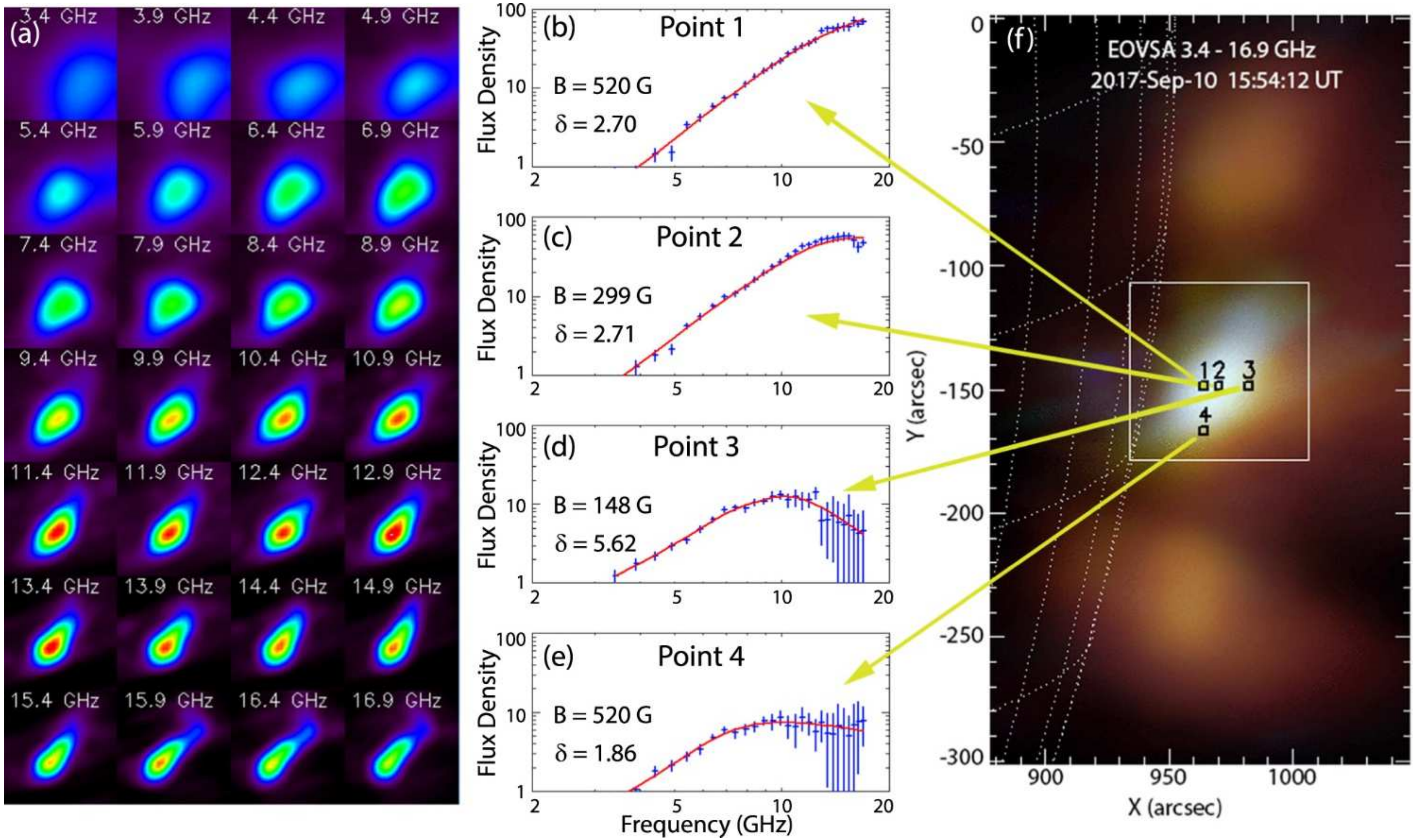
Fig. 15.7 in Markus J. Aschwanden (2005)



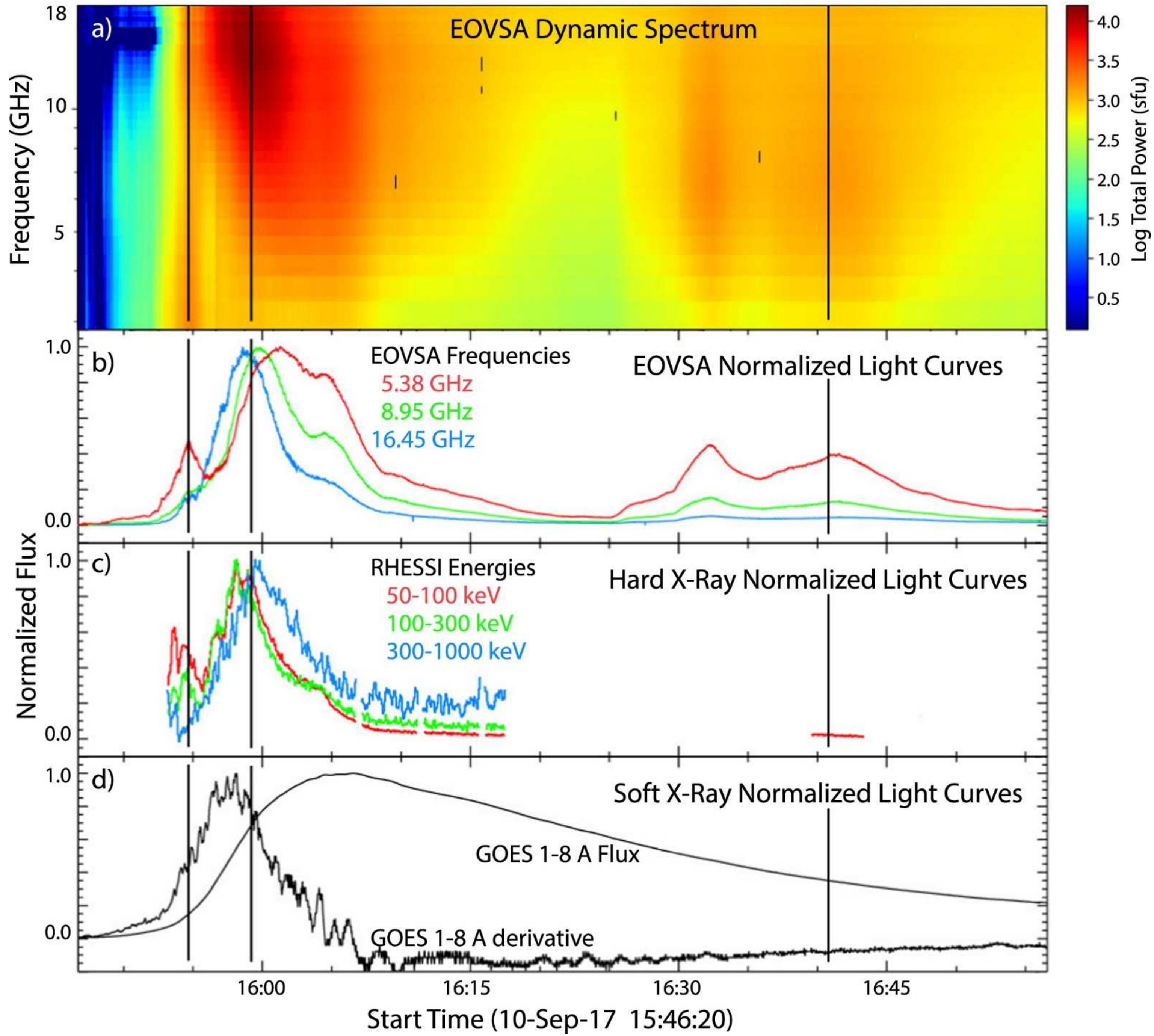
At low frequencies, the source maximum lies between footpoints because the gyrosynchrotron is optically thick there and the magnetic field is weaker there.

At higher frequencies, points between footpoints become optically thin, and they are consequently less bright than the footpoints.

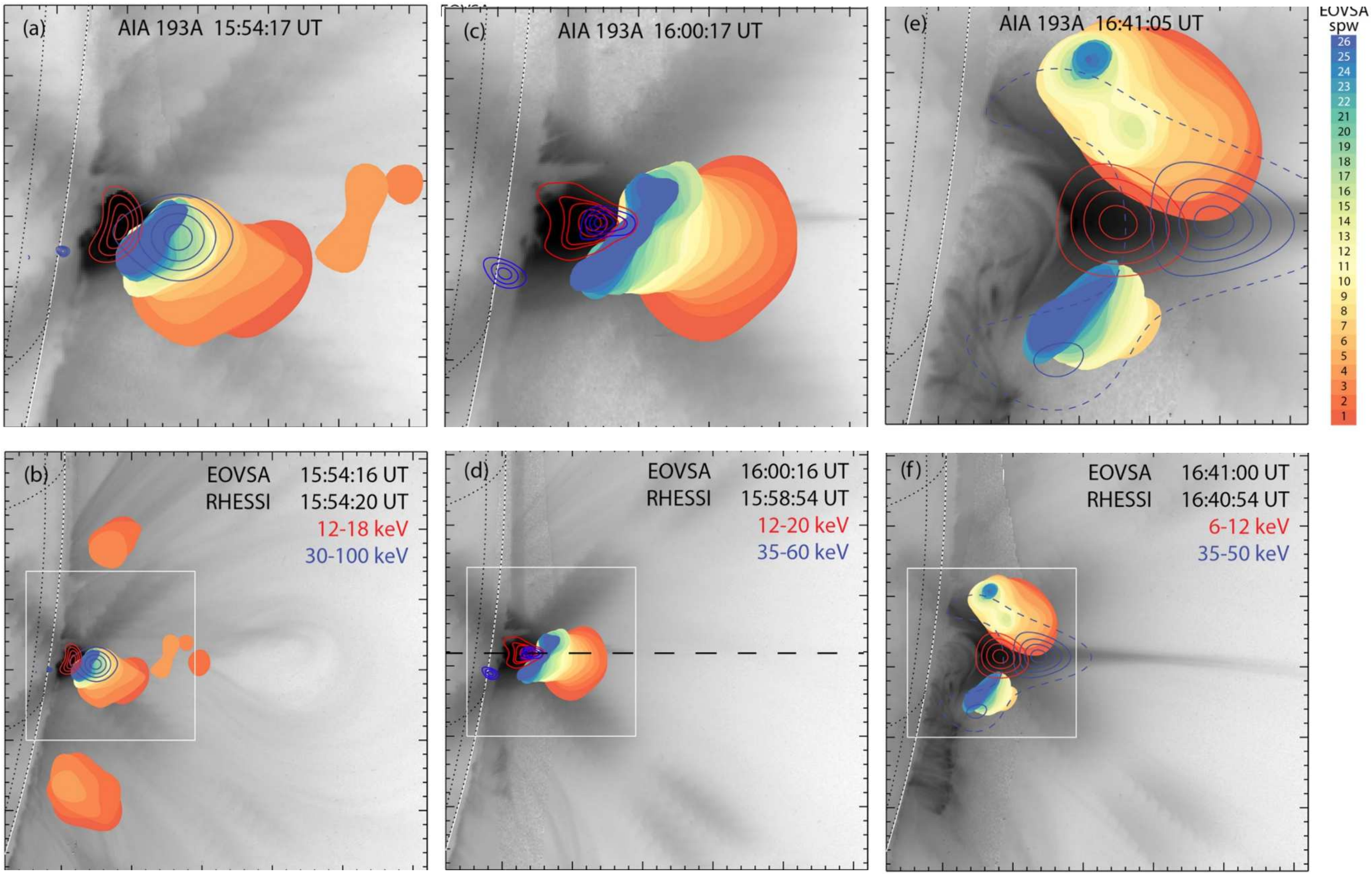
Fig. 15.4 in Markus J. Aschwanden (2005)



Gary et al. (2018)



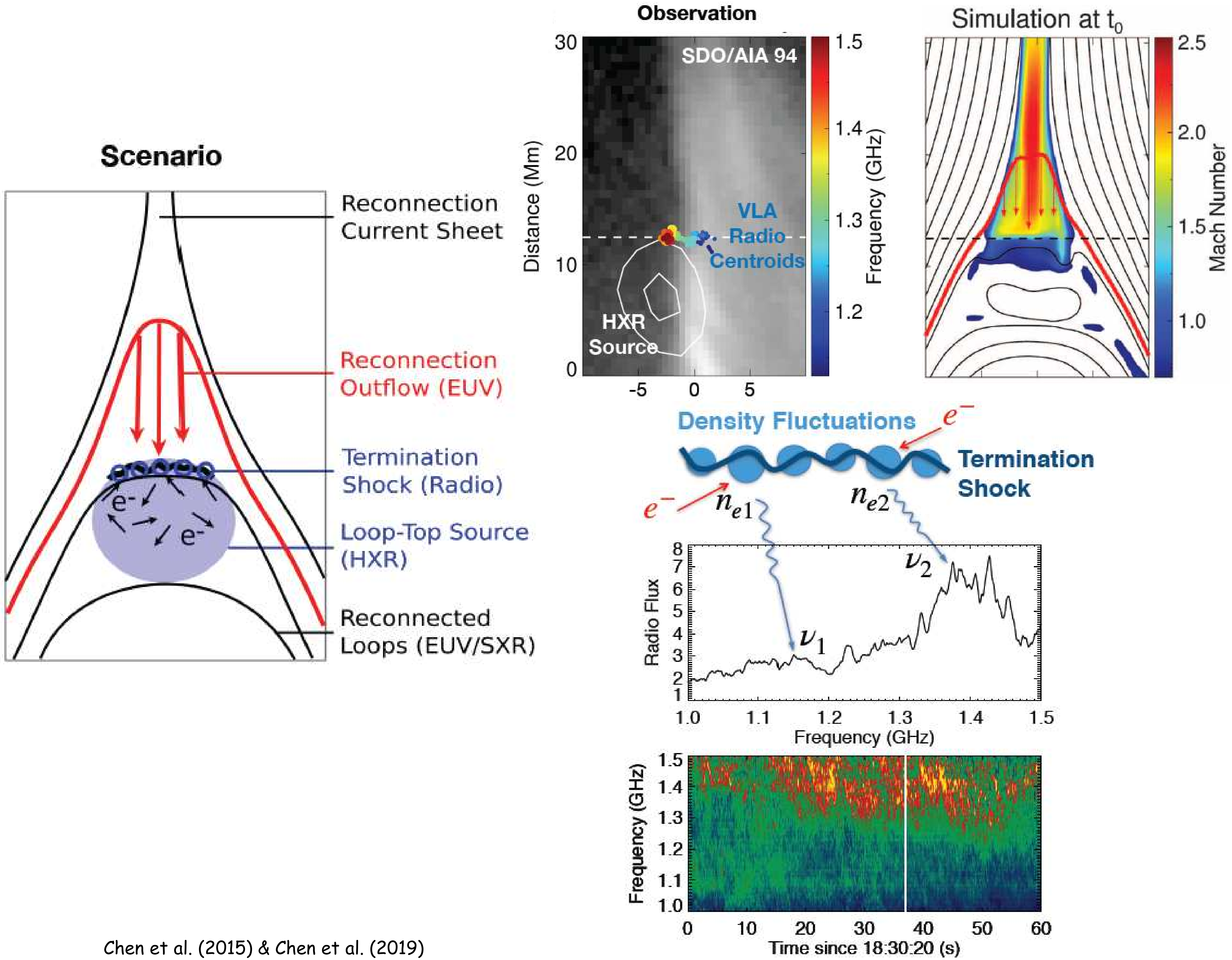
Gary et al. (2018)



Gary et al. (2018)

Emission mechanism	Frequency	Source/Exciter
(1) Incoherent radio emission:		
(1a) Free-free emission (bremsstrahlung)	$\nu \gtrsim 1$ GHz	Thermal plasma
– Microwave postbursts		Thermal plasma
(1b) Gyroemission	$\omega = s\Omega_e$	
Gyroresonance emission	$(s = 1, 2, 3, 4)$	Thermal electrons
Gyrosynchrotron emission	$(s \approx 10 - 100)$	Mildly relativistic electrons
– Type IV moving		Trapped electrons
– Microwave type IV		Trapped electrons
(2) Coherent radio emission:		
(2a) Plasma emission	$\nu_{pe} = 9000\sqrt{n_e}$	Electron beams
– Type I storms		Langmuir turbulence
– Type II bursts		Beams from shocks
– Type III bursts		Upward propagating beams
– Reverse slope (RS) bursts		Downward propagating beams
– Type J bursts		Beams along closed loops
– Type U bursts		Beams along closed loops
– Type IV continuum		Trapped electrons
– Type V		Slow electron beams
(2b) Electron-cyclotron maser:	$\omega = s\Omega_e/\gamma + k_{\|\|} v_{\|\|}$	Losscones
- Decimetric ms spike bursts		Losscones

Table 15.1 in Markus J. Aschwanden (2005)



Chen et al. (2015) & Chen et al. (2019)