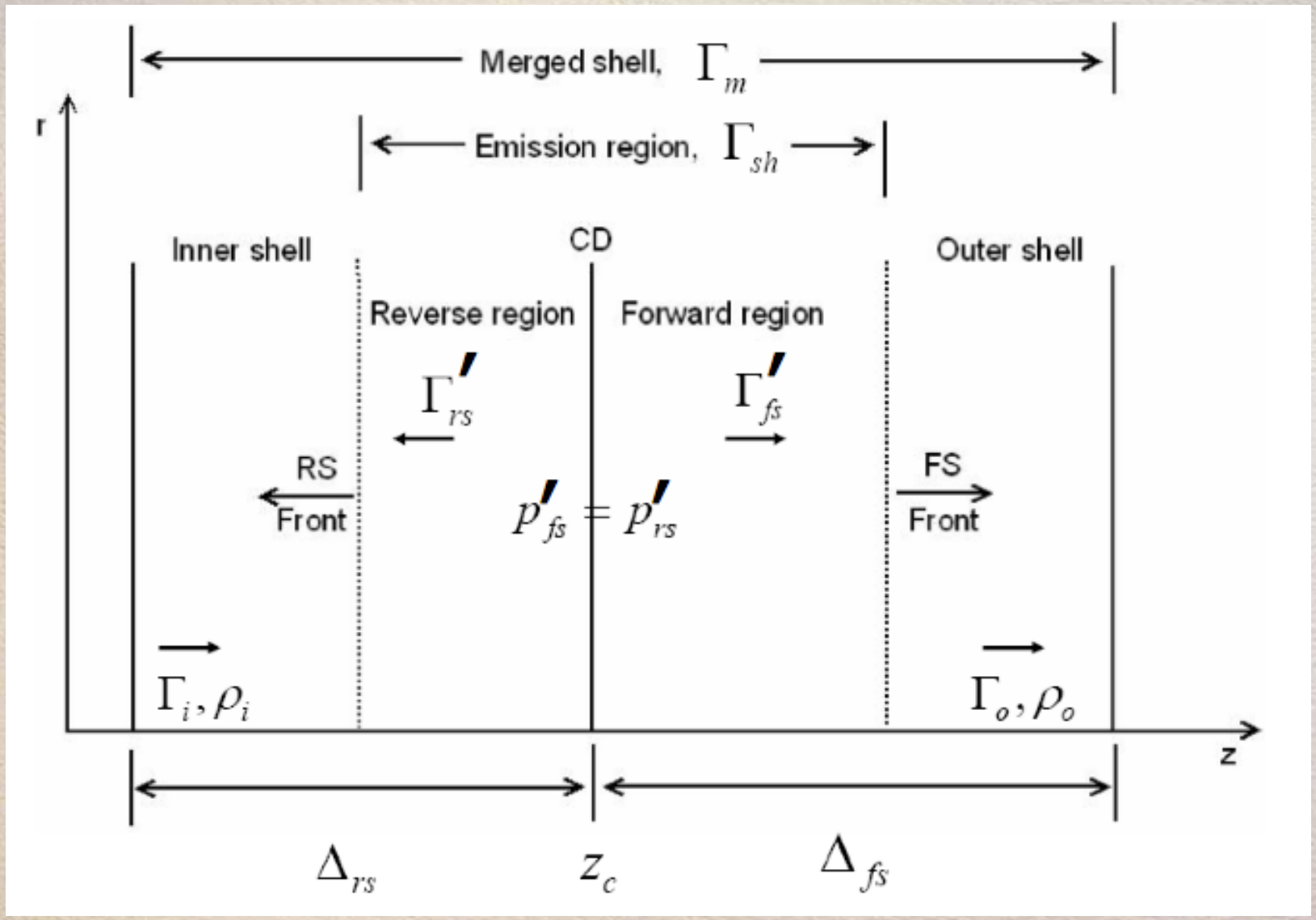
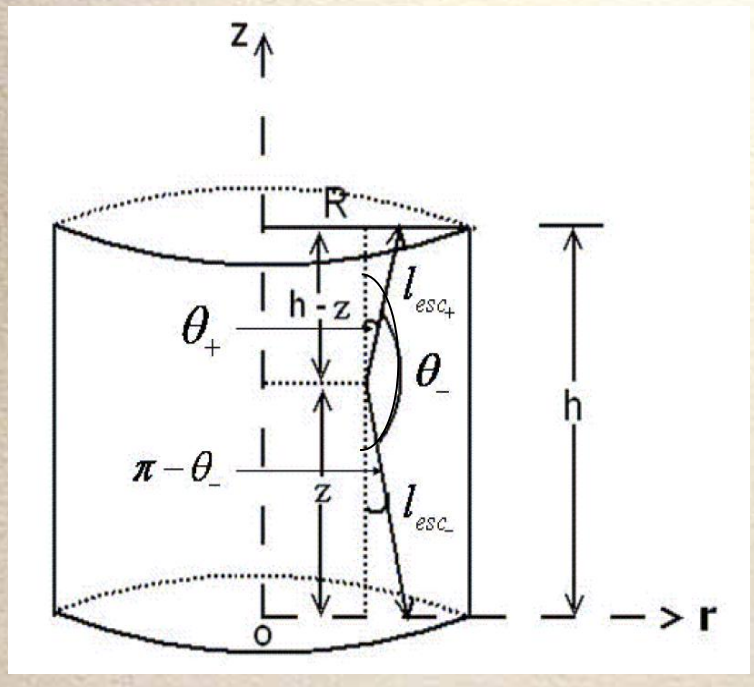
Spectral Modeling of Blazar Jets in Internal Shock Model Scenario

Authors: Manasvita Joshi, Markus Boettcher, Alan Marscher, Svetlana Jorstad


Merged shell, Γ_m
r
Emission region, Γ_{sh}
Inner shell
CD
Outer shell
Reverse region
Forward region
Γ'_{rs}
Γ'_{fs}
RS
Front
$p'_{fs} = p'_{rs}$
FS
Front
Γ_i, ρ_i
Γ_o, ρ_o
z
Δ_{rs}
z_c
Δ_{fs}

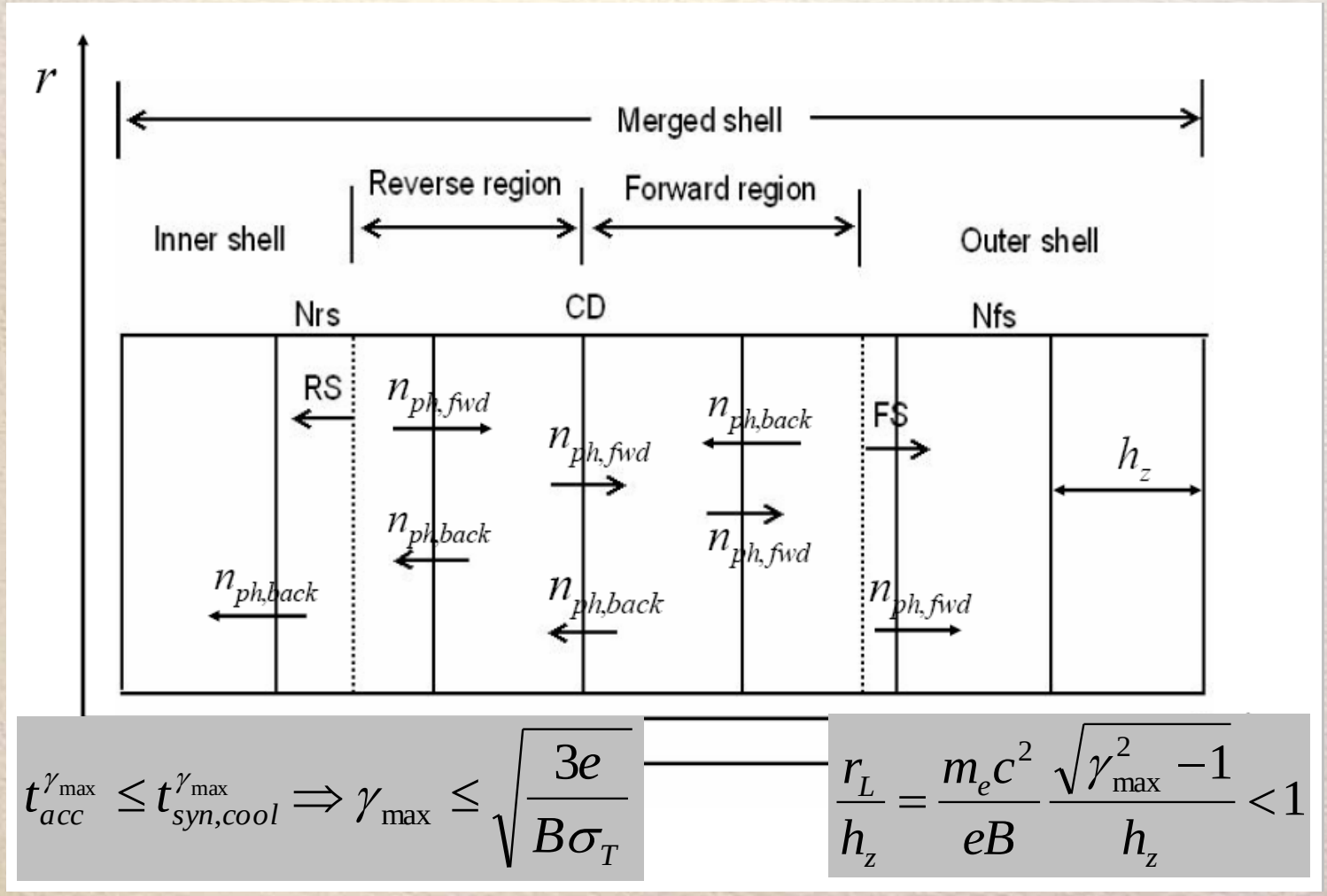
Appropriate photon escape probability functions of each zones need to be considered.



$$\left\langle t_{ph,esc}(r,z)\right\rangle = \frac{1}{4\pi c}\int_{0}^{2\pi+1}\int_{-1} l_{esc}(\mu,\phi;r,z)\,d\mu\,d\phi$$

$$\cos\theta = \mu$$

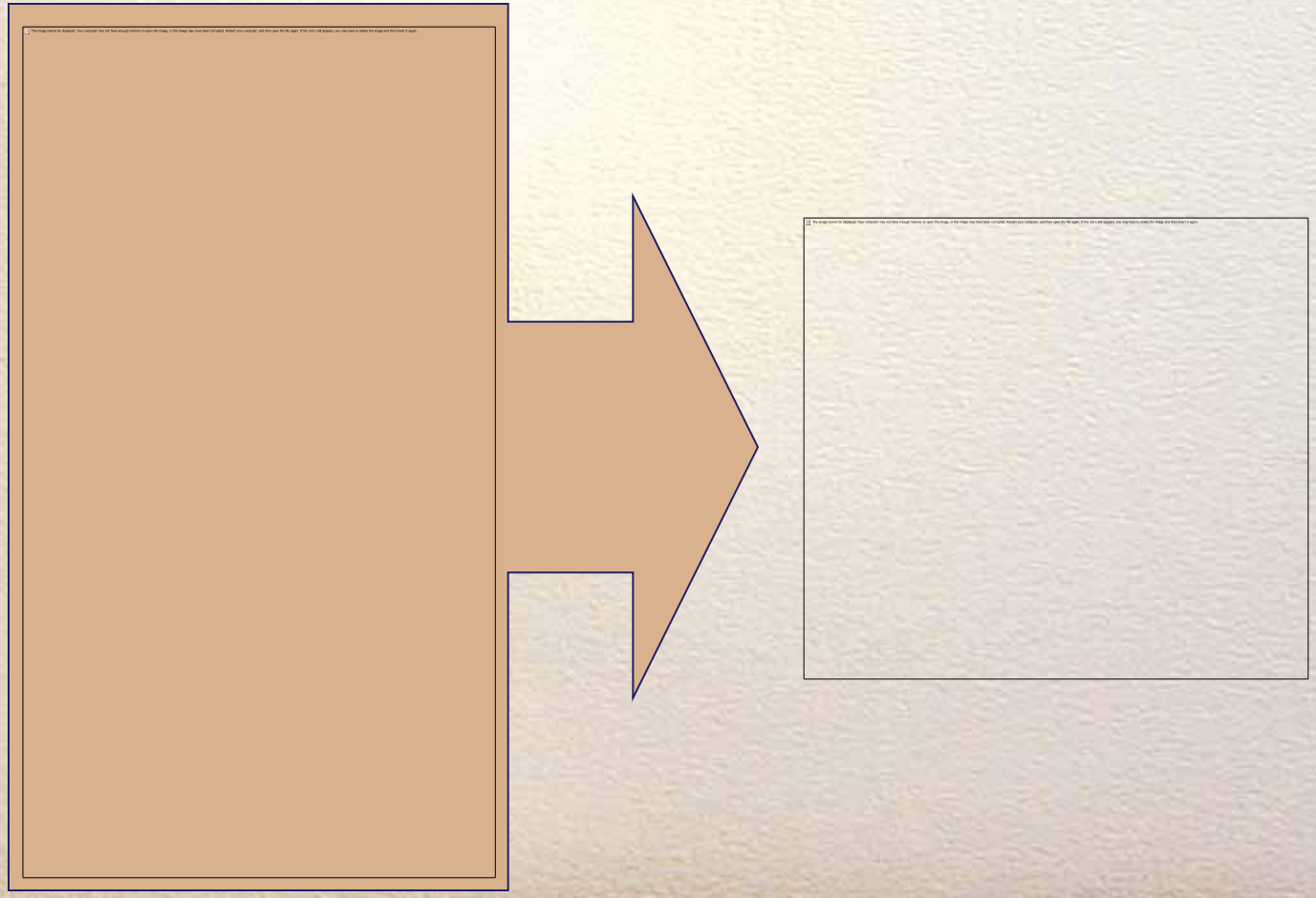
Multi-zone Radiation Feedback Scheme

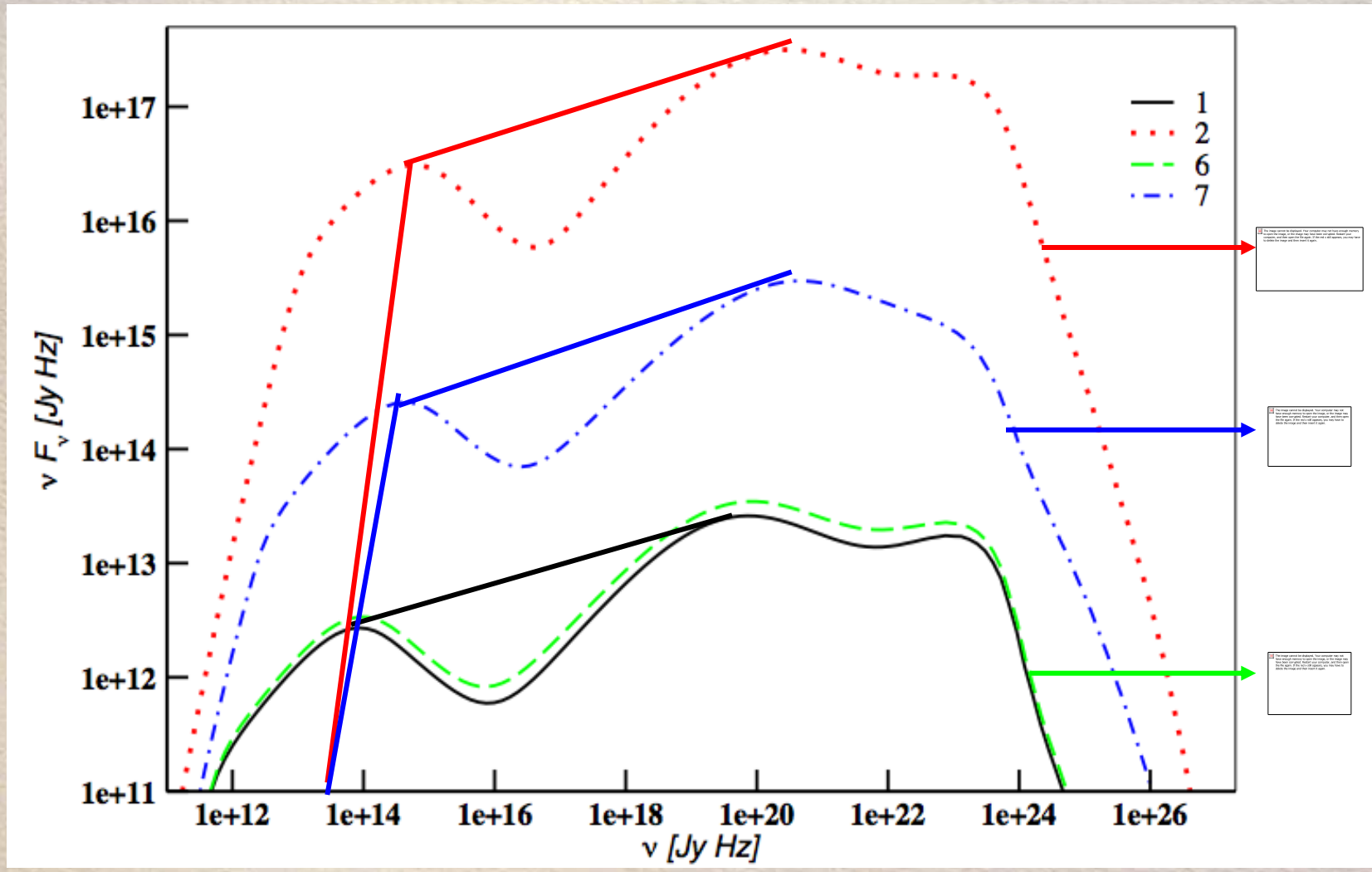


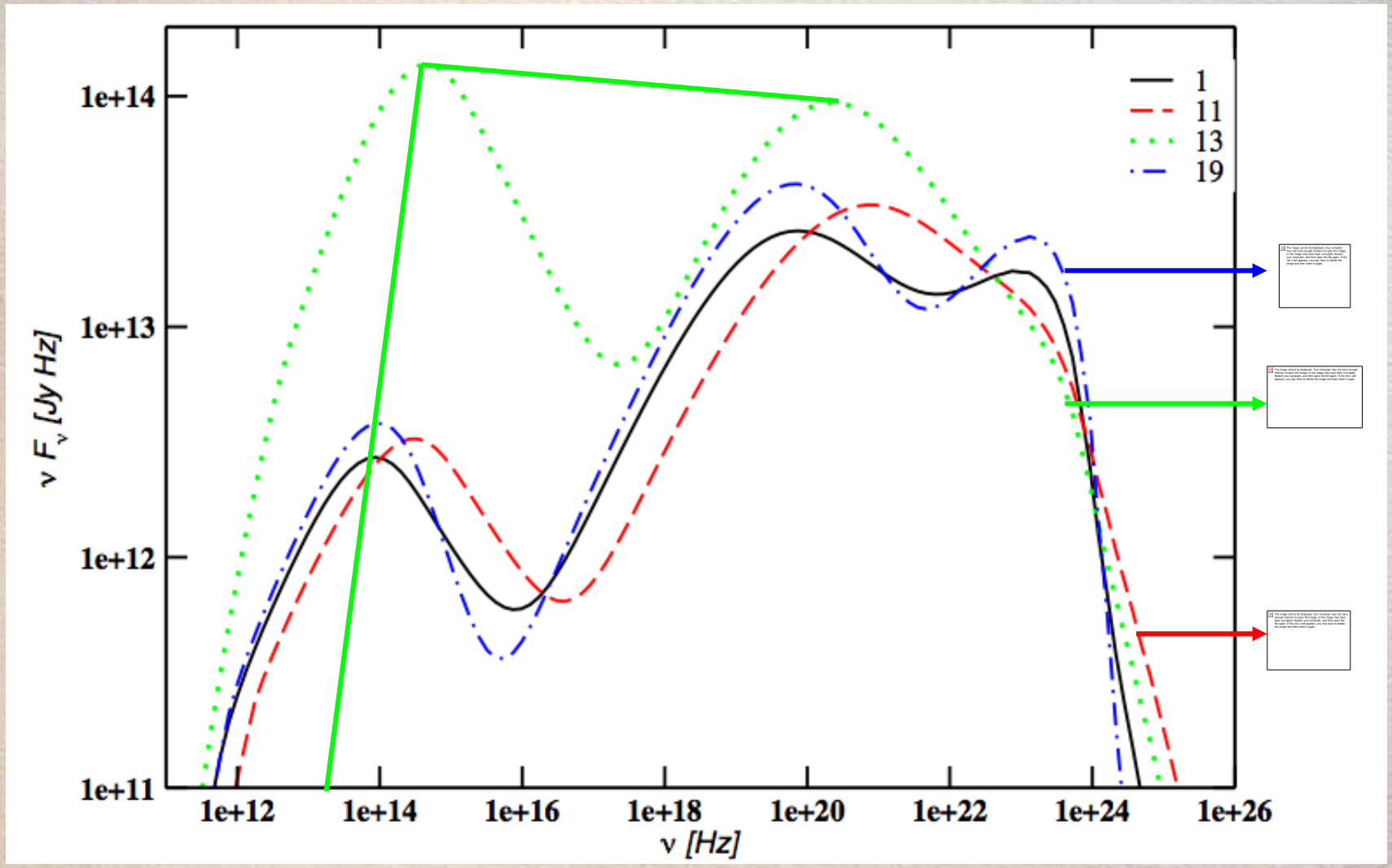
$$t_{acc}^{\gamma_{\max}} \le t_{syn,cool}^{\gamma_{\max}} \Rightarrow \gamma_{\max} \le \sqrt{\frac{3e}{B\sigma_T}}$$

$$\frac{r_L}{h_z} = \frac{m_e c^2}{eB}\frac{\sqrt{\gamma_{\max}^2 - 1}}{h_z} < 1$$

Parameter Study




1e+17
1e+16
1e+15
1e+14
1e+13
1e+12
1e+11
ν F_ν [Jy Hz]
1e+12
1e+14
1e+16
1e+18
1e+20
1e+22
1e+24
1e+26
ν [Jy Hz]
1
2
6
7


1e+14
1e+13
1e+12
1e+11
ν F_ν [Jy Hz]
1e+12
1e+14
1e+16
1e+18
1e+20
1e+22
1e+24
1e+26
ν [Hz]
1
11
13
19

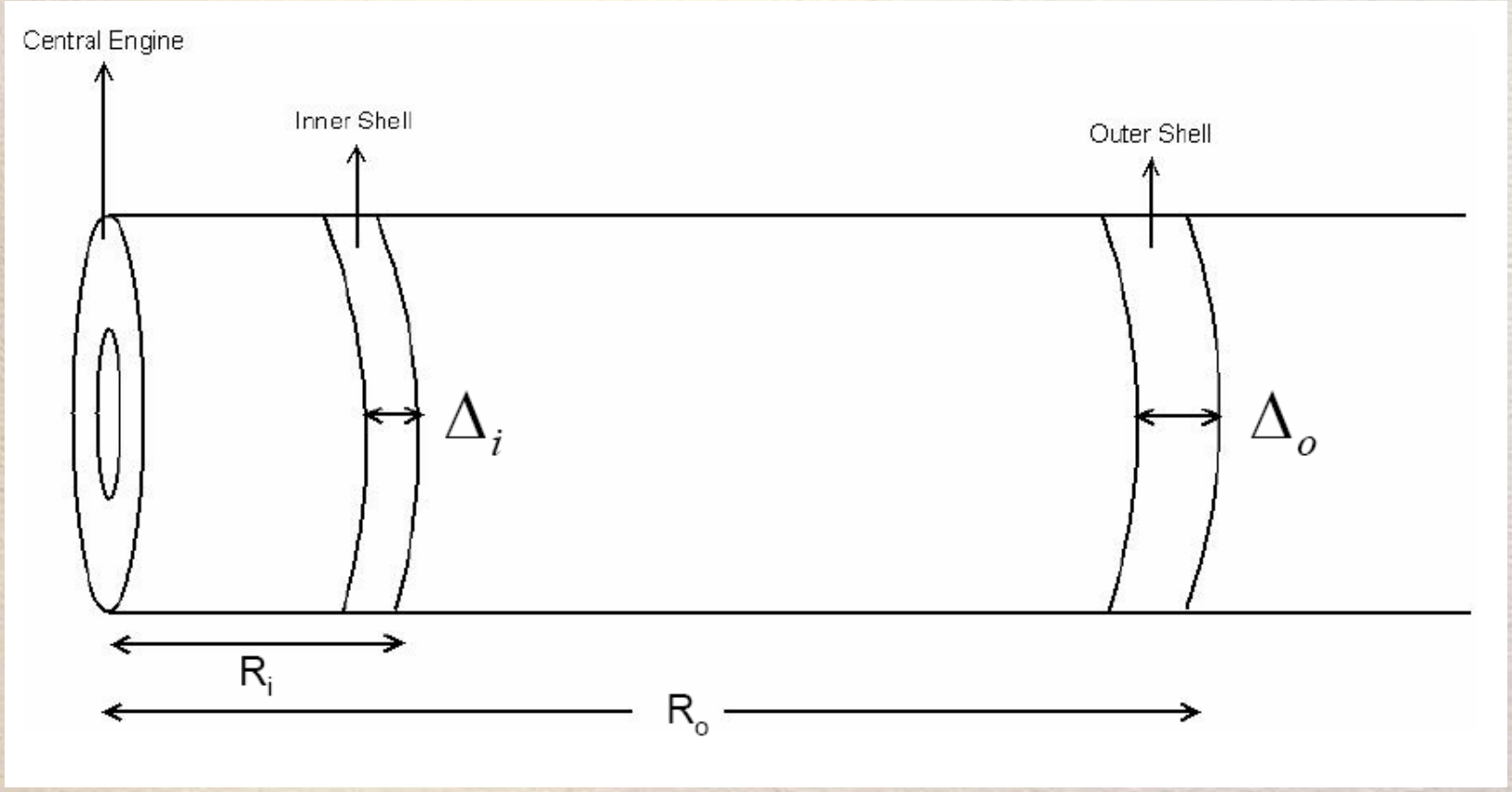
Recap…

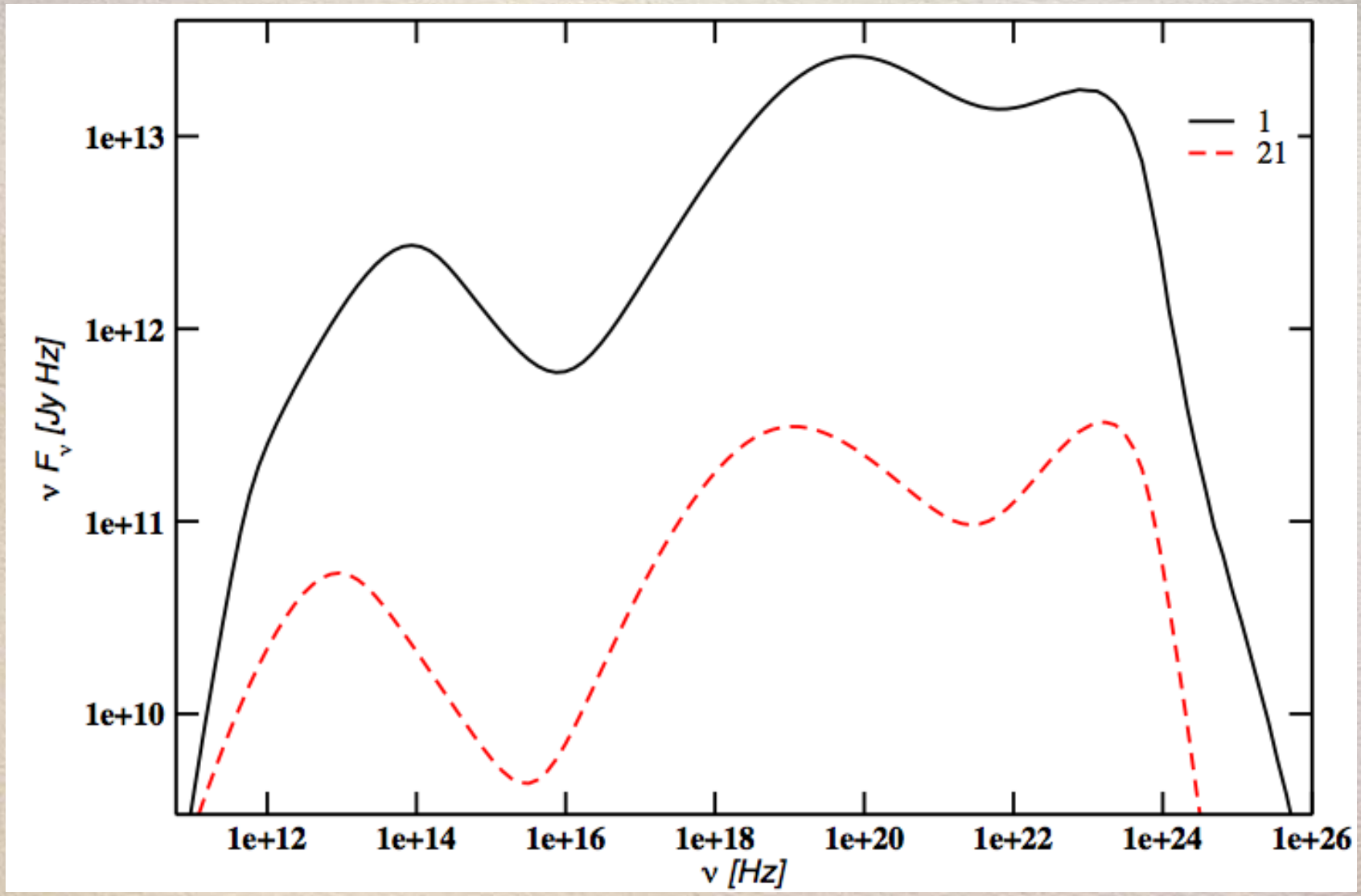
- Internal shock model used to compute spectral energy distribution of blazars.
- Multi-zone radiation feedback scheme developed to address inhomogeneity in photon density.
- Synchrotron and SSC emission calculated

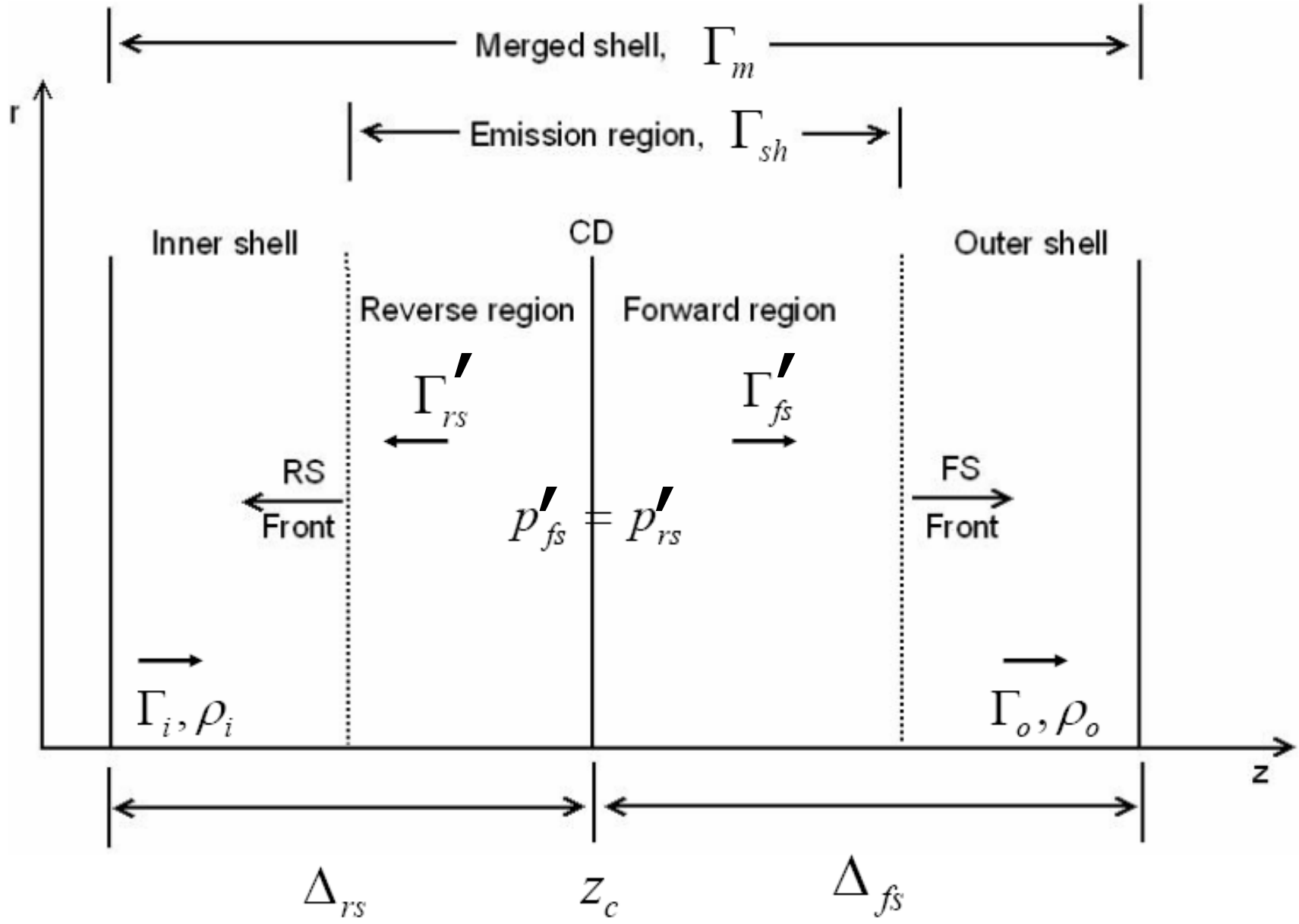
Work in Progress

- Application to quasar OJ287
- Inclusion of external Compton component
- Application to 3C279 and other blazar sources.

???


Central Engine
Inner Shell
Outer Shell
Δ_i
Δ_o
R_i
R_o


1e+13
1e+12
1e+11
1e+10
ν F_ν [Jy Hz]
1e+12
1e+14
1e+16
1e+18
1e+20
1e+22
1e+24
1e+26
ν [Hz]
1
21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