Radiative Acceleration of Outflowing Clouds

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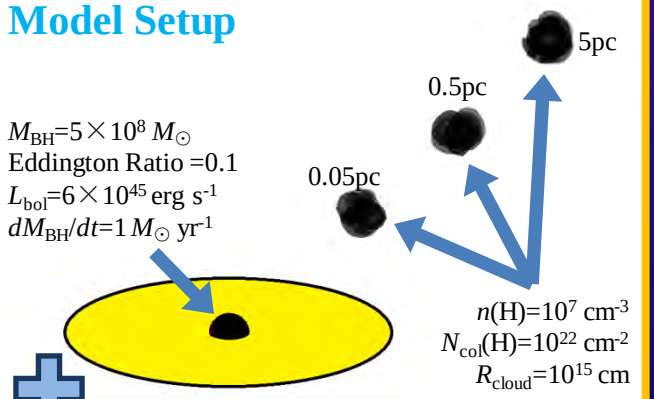
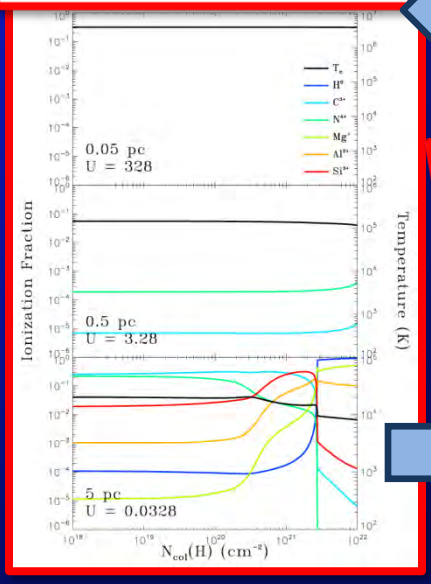
Abstract

Massive outflow is accepted as one of the major mechanism for AGN feedback, and is considered being accelerated by the radiation pressure from the central engine. Using CLOUDY, we can simulate the physical conditions for the illuminated clouds, evaluate the radiation pressure on the medium, and estimate the acceleration considering the gravity and centrifugal force.

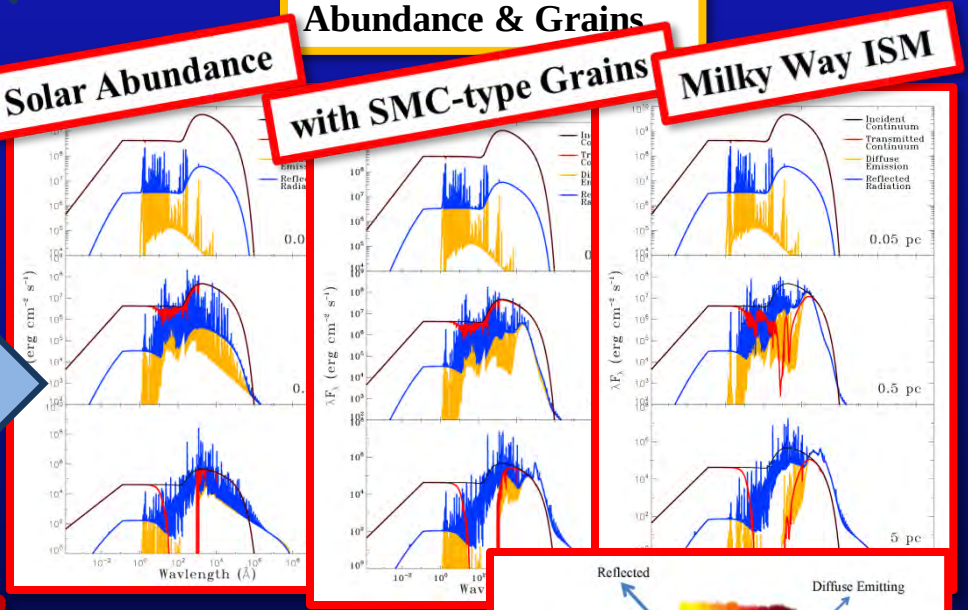
Model Setup

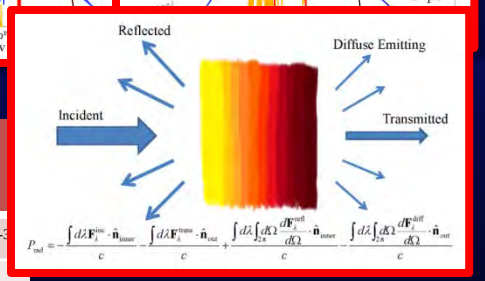


Ionization Structure



Chemical Composition: Abundance & Grains





Result & Conclusion

d (pc)	Gravity (dyn/cm^2)	Centrifugal (dyn/cm^2)		Solar Abundance	with SMC-type Grains	ISM
0.05	6.5×10^{-2}	6.5×10^{-2}	P_{rad} (dyn/cm^2)	8.2×10^{-3}	8.2×10^{-3}	8.2×10^{-3}
			a (cm/s^2)	0.36	0.36	0.36
0.5	6.5×10^{-4}	6.5×10^{-5}	P_{rad} (dyn/cm^2)	3.1×10^{-4}	7.0×10^{-4}	5.2×10^{-3}
			a (cm/s^2)	$< F_{grav}$	5.0×10^{-3}	0.20
5	6.5×10^{-6}	6.5×10^{-8}	P_{rad} (dyn/cm^2)	2.6×10^{-5}	4.0×10^{-5}	5.7×10^{-5}
			a (cm/s^2)	8.1×10^{-4}	1.4×10^{-3}	2.1×10^{-3}

Grains are Critical to Acceleration!