Overview of the Milky Way Galaxy

Luminous (stellar) Mass:
$$3 \times 10^{10} \, M_{\text{sun}}$$

Dynamical Mass (total)
$$2 \times 10^{12} \, M_{\text{sun}}$$

Interstellar Mass:

- Neutral (H I)  $$3 \times 10^{9} \, M_{\text{sun}}$$
- Ionized (H II)  $$1 \times 10^{9} \, M_{\text{sun}}$$
- Molecular (H$_2$)  $$1 \times 10^{9} \, M_{\text{sun}}$$

Total incl Helium (36%)
$$7 \times 10^{9} \, M_{\text{sun}}$$
Milky Way (infrared image)
Milky Way Galactic Center (Sagittarius)
(Spitzer Space Telescope)

900 ltyrs at $R_0 = 8.4$ kpc
Hot O and B stars with H II regions

Regions of star formation

OB association

Slow motion of spiral arm

Fast motion of interstellar gas and dust — this material is compressed within the spiral arm
Edge-on Spiral
(NGC 4013)
NGC 1365
(largest barred spiral)

200,000 light yrs across
(taken by ESA/La Silla 1.5m telescope)

Wednesday, March 30, 2011
Young stars form in spiral arms of galaxies

Interstellar gas clouds are organized and compacted by “spiral density waves”

Then, gravity takes over
LMC
Highlighting Supernova Remnants
\[ d \approx 50 \text{ kpc} \]
Orion Nebula and Trapezium Stars

Orion Star Cluster (infrared image)
Dying Stars
(Planetary Nebulae with White Dwarf)

NGC 2392 • “Eskimo” Nebula
HST • WFPC2
NASA, A. Fruchter and the ERO Team (STScI) • STScI-PRC00-07
Tycho’s SNR (1572)

7500 light years away
Cassiopeia A
SNR (1680)

Compact X-ray Source (neutron star?)
S-147 in Taurus

Older SNR
40,000 yrs ?