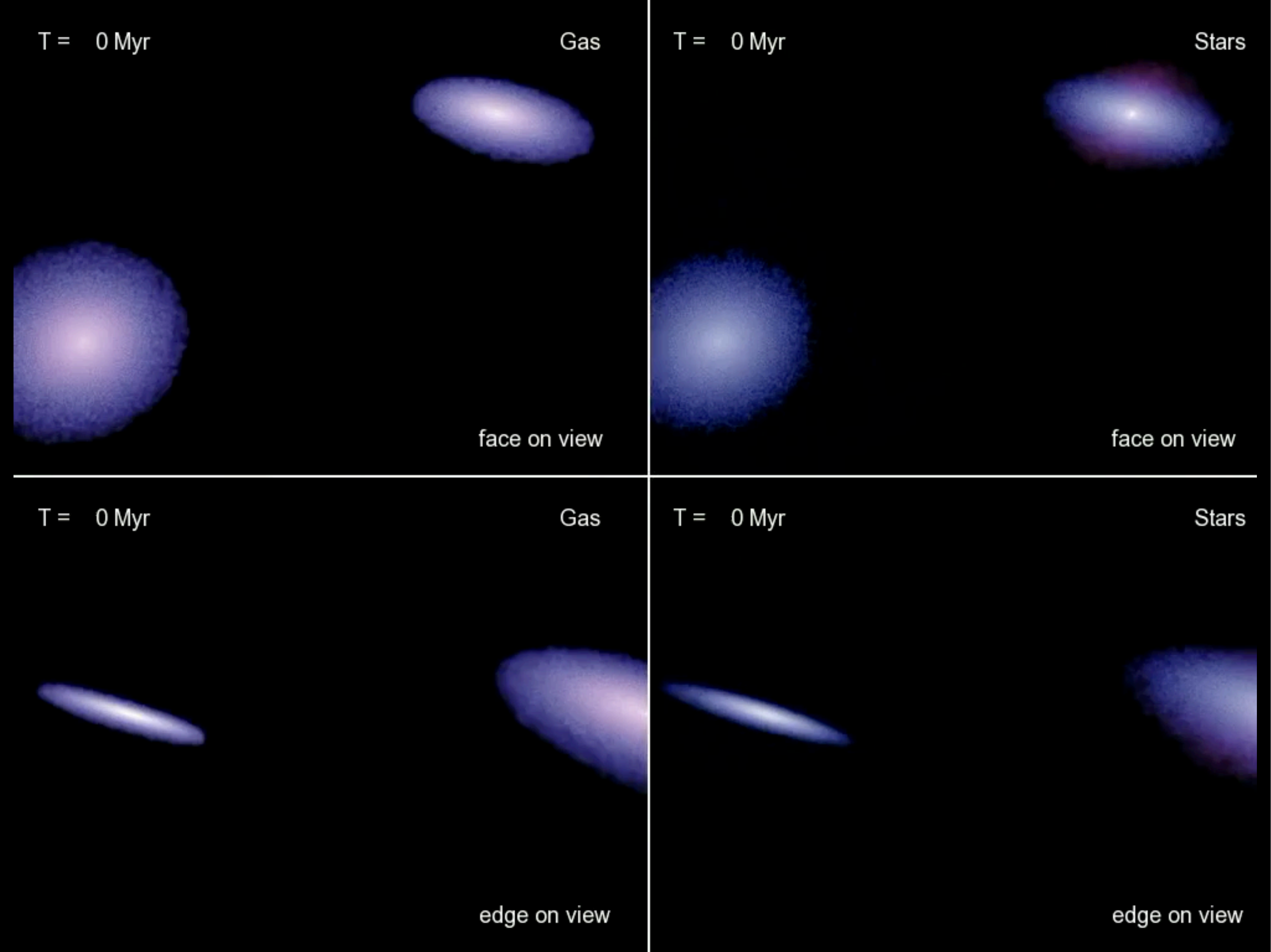

T = 0 Myr
Gas
face on view
T = 0 Myr
Stars
face on view
T = 0 Myr
Gas
edge on view
T = 0 Myr
Stars
edge on view

Kepler potential: $\phi(r) = -\frac{GM}{r}$

Plummer model: $\phi_P(r) = -\frac{GM}{(r^2+a^2)^{1/2}}$

Kuzmin disk: $\phi_K(R,z) = -\frac{GM}{(R^2+(a+|z|)^2)^{1/2}}$

Miyamoto disk: $\phi_M(R,z) = -\frac{GM}{\left(R^2+\left(a+\sqrt{z^2+b^2}\right)^2\right)^{1/2}}$

Logarithmic: $\phi_L(R) = \frac{1}{2}v_0^2 \ln\left(R_c^2 + \frac{R^2}{a^2}\right)$

$\phi_L(R,z) = \frac{1}{2}v_0^2 \ln\left(R_c^2 + \frac{R^2}{a^2} + \frac{z^2}{b^2}\right)$

(etc.)

Phase-space distribution function $f(\vec{x}, \vec{v})$:

$$n(\vec{x}) = \int_{-\infty}^{\infty} f(\vec{x}, \vec{v})\, d^3 v$$

$$n\, \vec{u}(\vec{x}) = \int_{-\infty}^{\infty} \vec{v}\, f(\vec{x}, \vec{v})\, d^3 v$$

$$n\, \sigma^2(\vec{x}) = \int_{-\infty}^{\infty} (\vec{v} - \vec{u})^2 f(\vec{x}, \vec{v})\, d^3 v$$

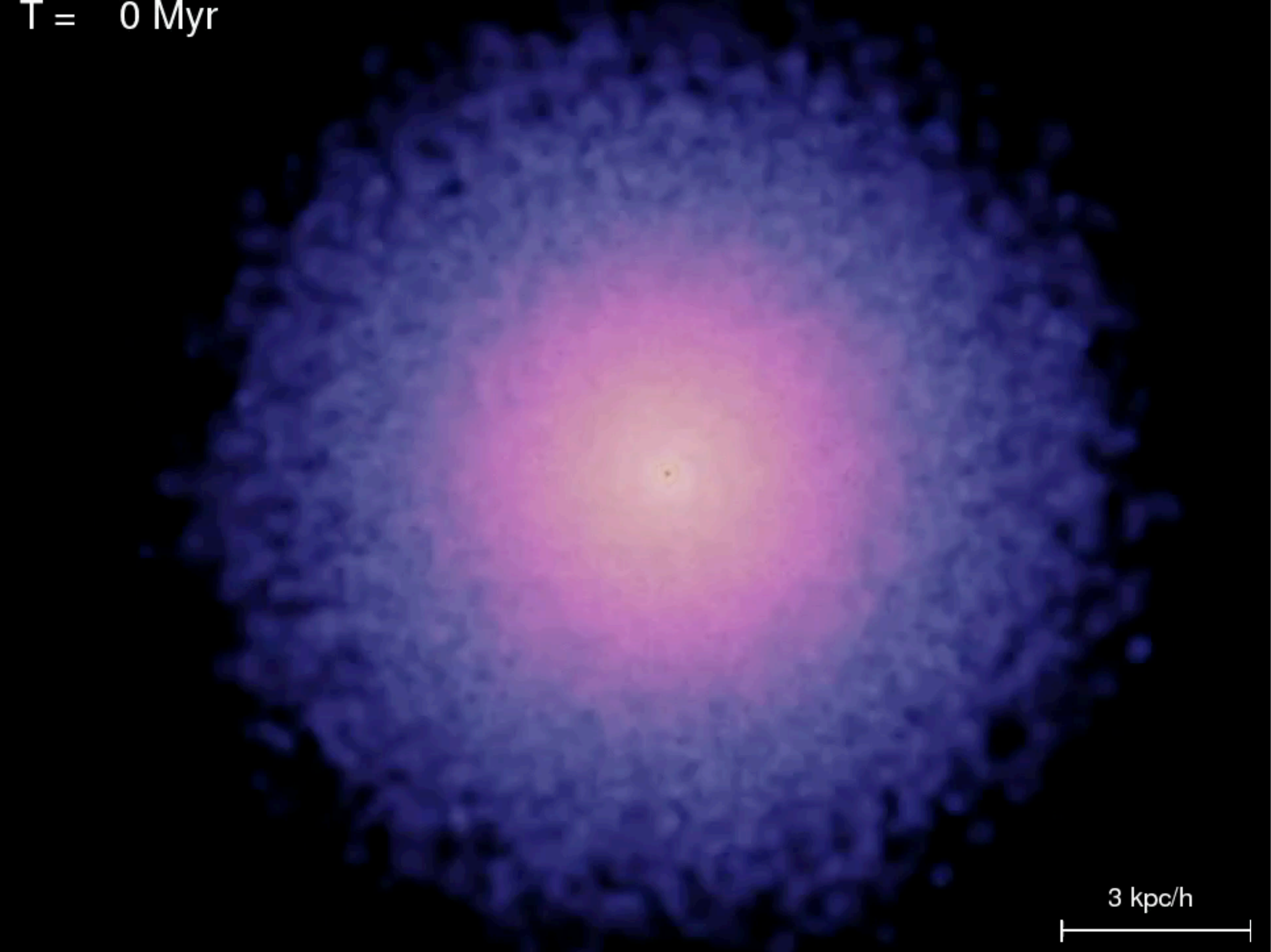
Jeans theorem: $f(I_1, I_2, \ldots)$ gives <u>self-consistent</u> solution

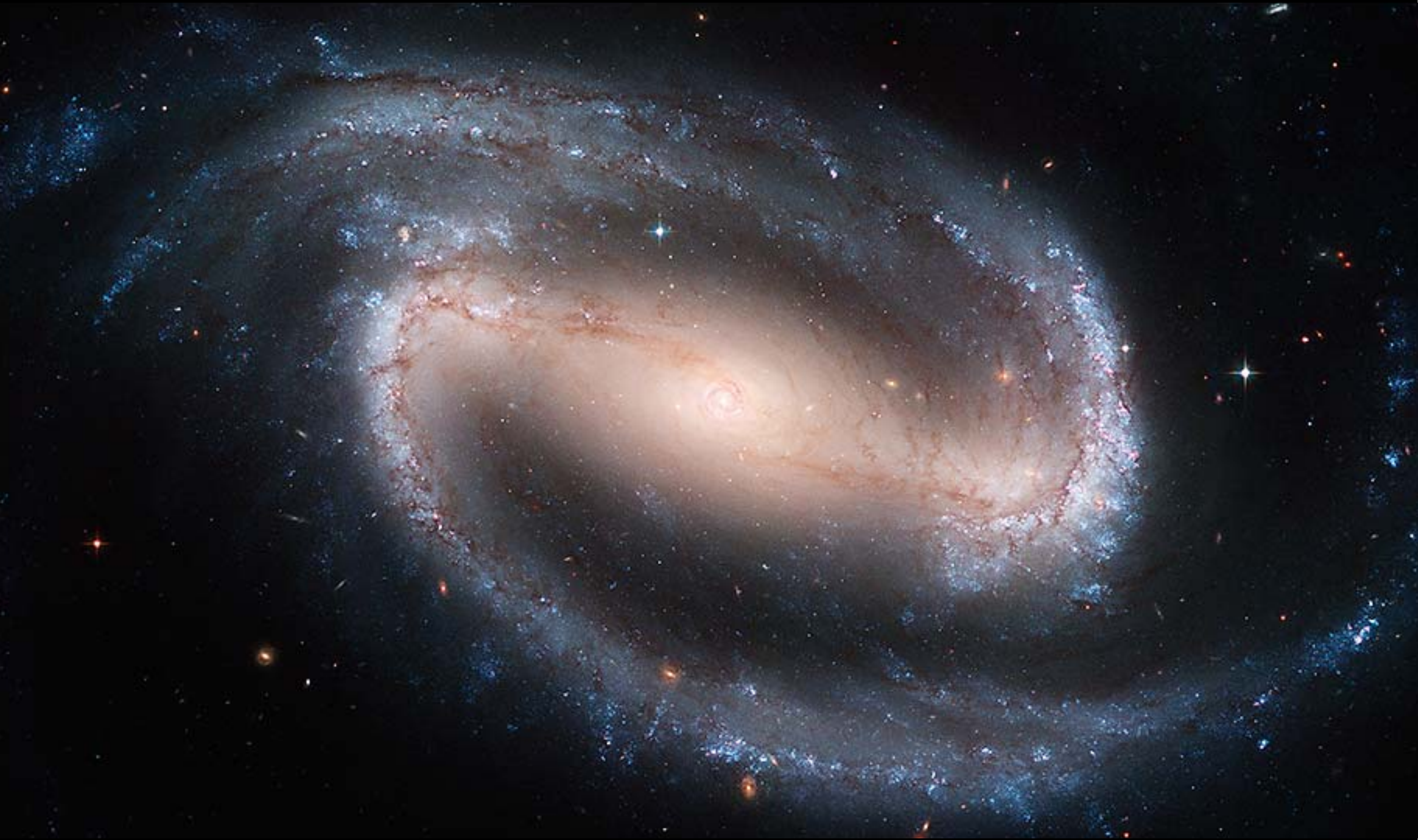
Plummer model: $f(E) = A(-E)^{7/2} \quad (E < 0)$

Isothermal model: $f(E) = A\, e^{-E/kT}$

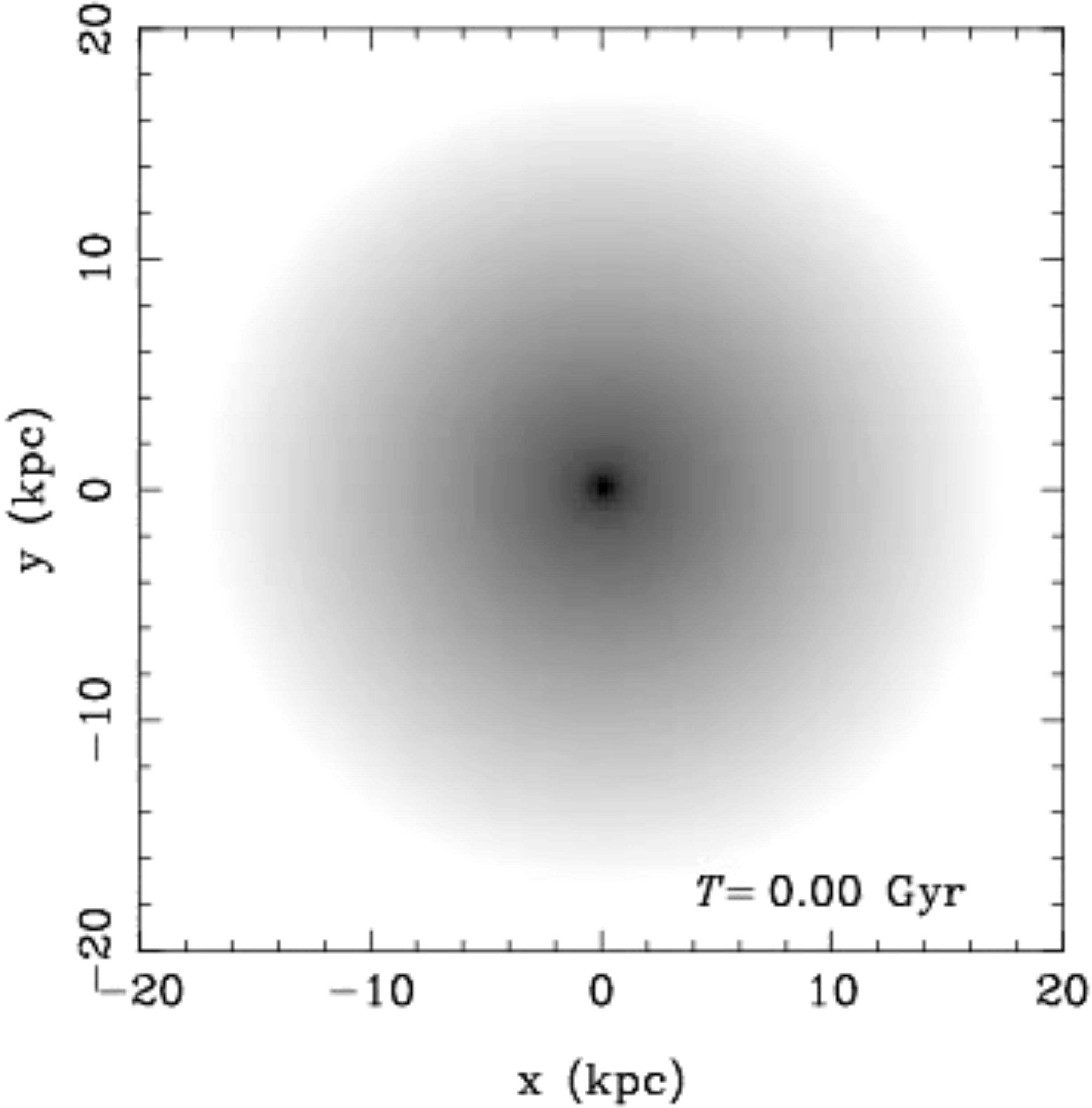
Lowered isothermal: $f(E) = A\left(e^{-E/kT} - 1\right)$

Anisotropy: $f(E, J) = A\left(e^{-E/kT} - 1\right) e^{-J^2/2r_a^2 kT}$


T =   0 Myr
3 kpc/h



Bedorf & Portegies Zwart 2015



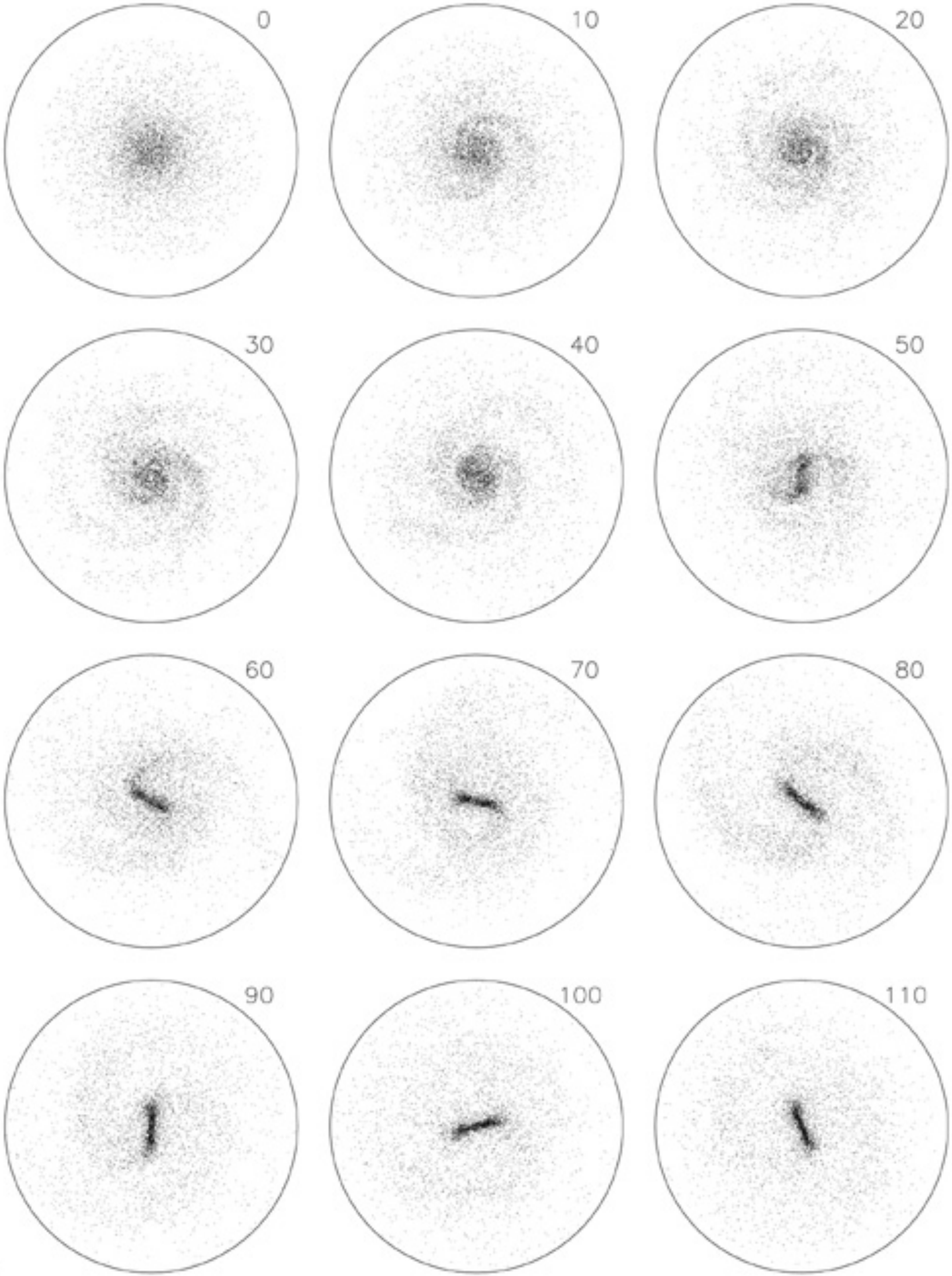
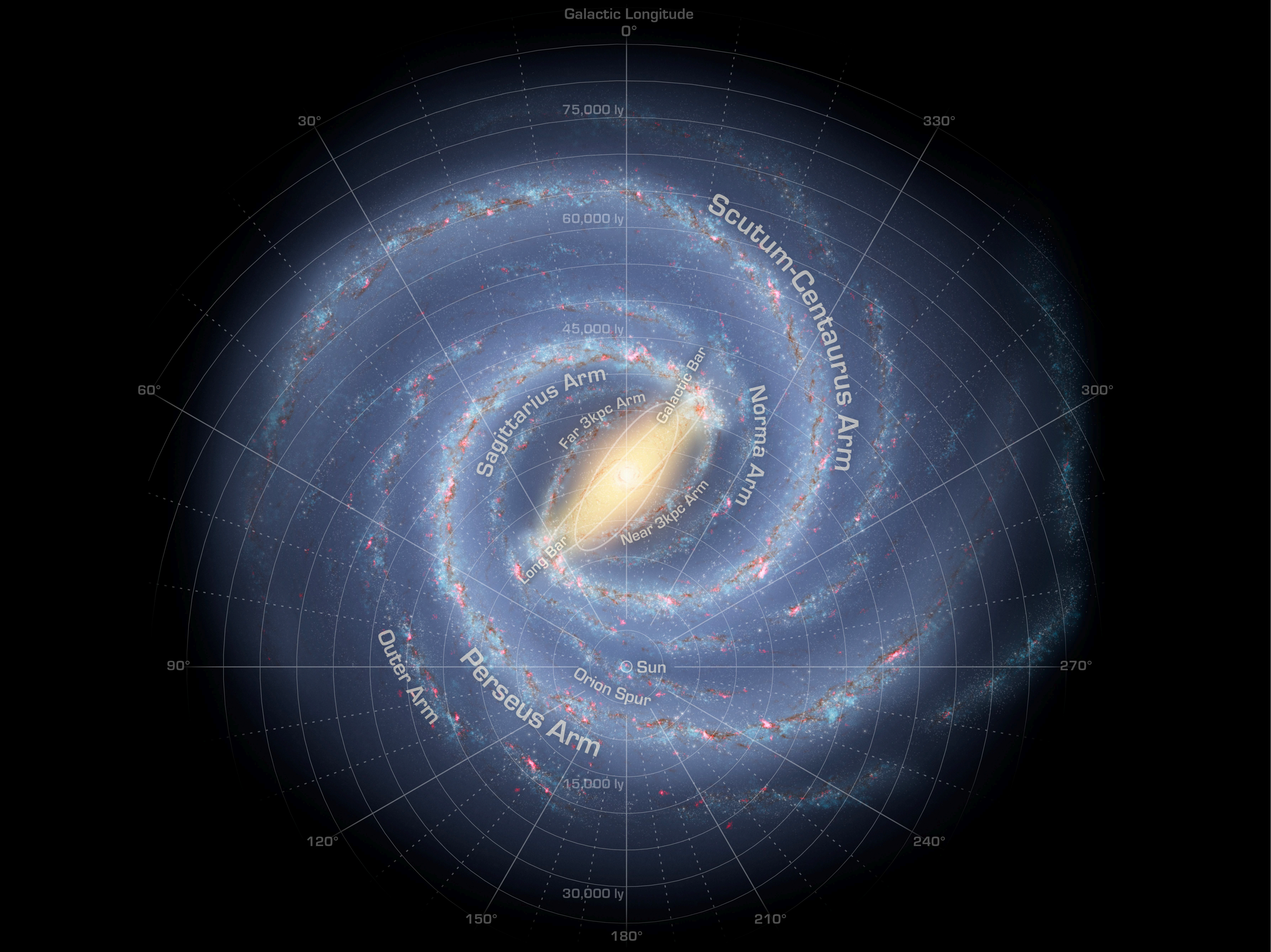


Fig 5.31 (J.Sellwood) 'Galaxies in the Universe' Sparke/Gallagher CUP 2007



Galactic Longitude
0°
30°
330°
60°
300°
90°
270°
120°
240°
150°
210°
180°
75,000 ly
60,000 ly
45,000 ly
30,000 ly
15,000 ly
Scutum-Centaurus Arm
Sagittarius Arm
Far 3kpc Arm
Galactic Bar
Norma Arm
Near 3kpc Arm
Long Bar
Outer Arm
Perseus Arm
Sun
Orion Spur

$$\omega^2 = v_s^2 k^2$$

$$\omega^2 = v_s^2 k^2 - 4\pi G\rho$$

$$\omega^2 = v_s^2 k^2 - 4\pi G\rho + 4\Omega^2$$

$$\omega^2 = v_s^2 k^2 + 4\pi G\rho$$

$$\omega^2 = v_s^2 k^2 - 2\pi G\Sigma|k| + 4\Omega^2$$