Where are all the KBOs ?

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TAOS
(Taiwanese-American Occultation Survey)

- The method that TAOS used to detect the KBOs is →
- The size distribution of KBOs reflects a history of planet formation and dynamics.
- The survey targeted KBOs with sizes between 0.5 km and 28 km

News

- After accumulating more than 200 hours of data watching for stellar flickers, TAOS did ***NOT*** spot any occultation.
- The fact that no occultation were seen sets a upper limit on the number density of KBOs between 0.5 km and 28 km in diameter

News

The expectd number of detected events

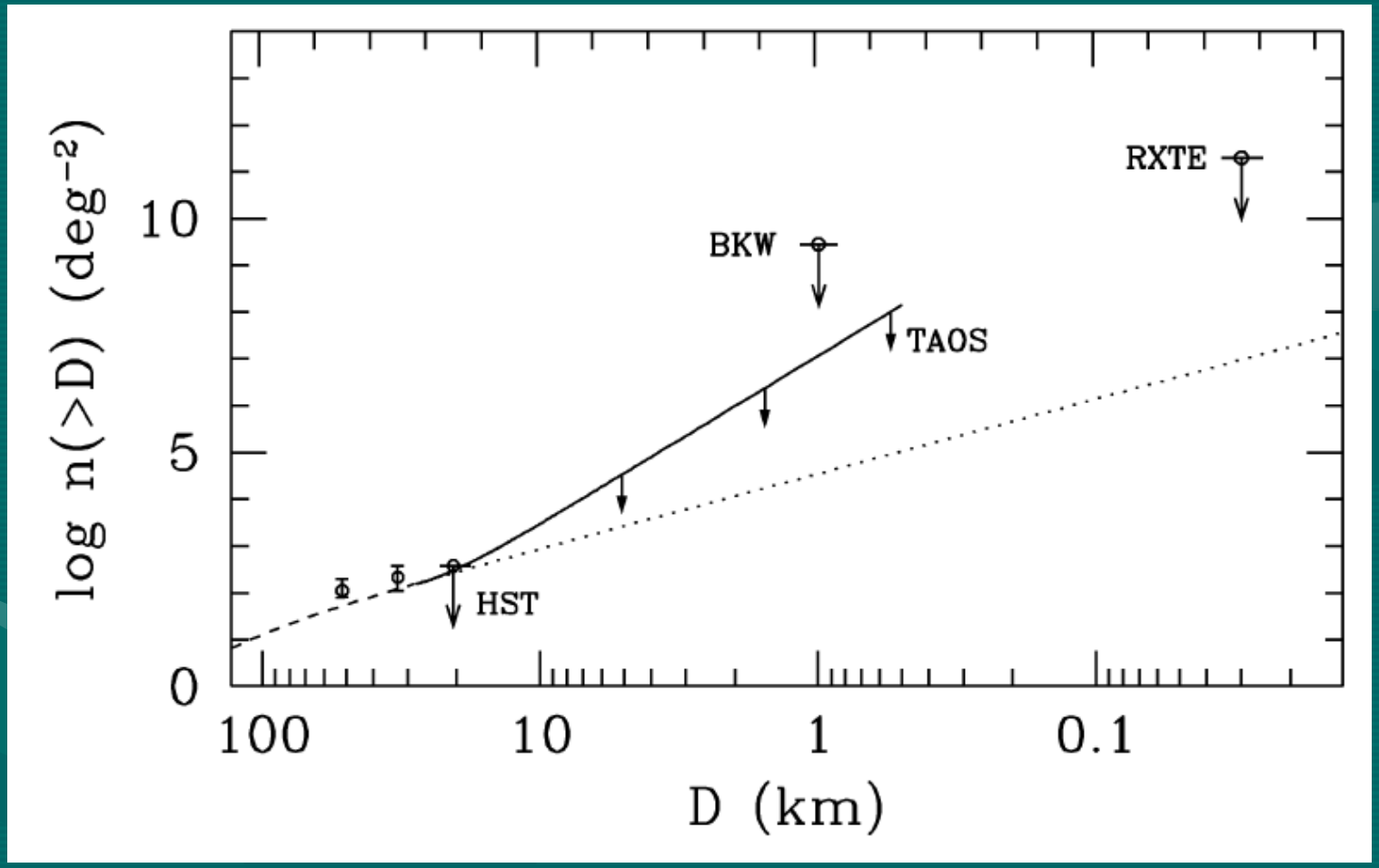
effective solid angle

$$N_{\exp} = \int_{D_2}^{D_1} \frac{dn}{dD} \Omega_e(D) dD,$$

differential surface number density

a power-law size distribution $dn/dD = n_B(D/28\ \mathrm{km})^{-q}$

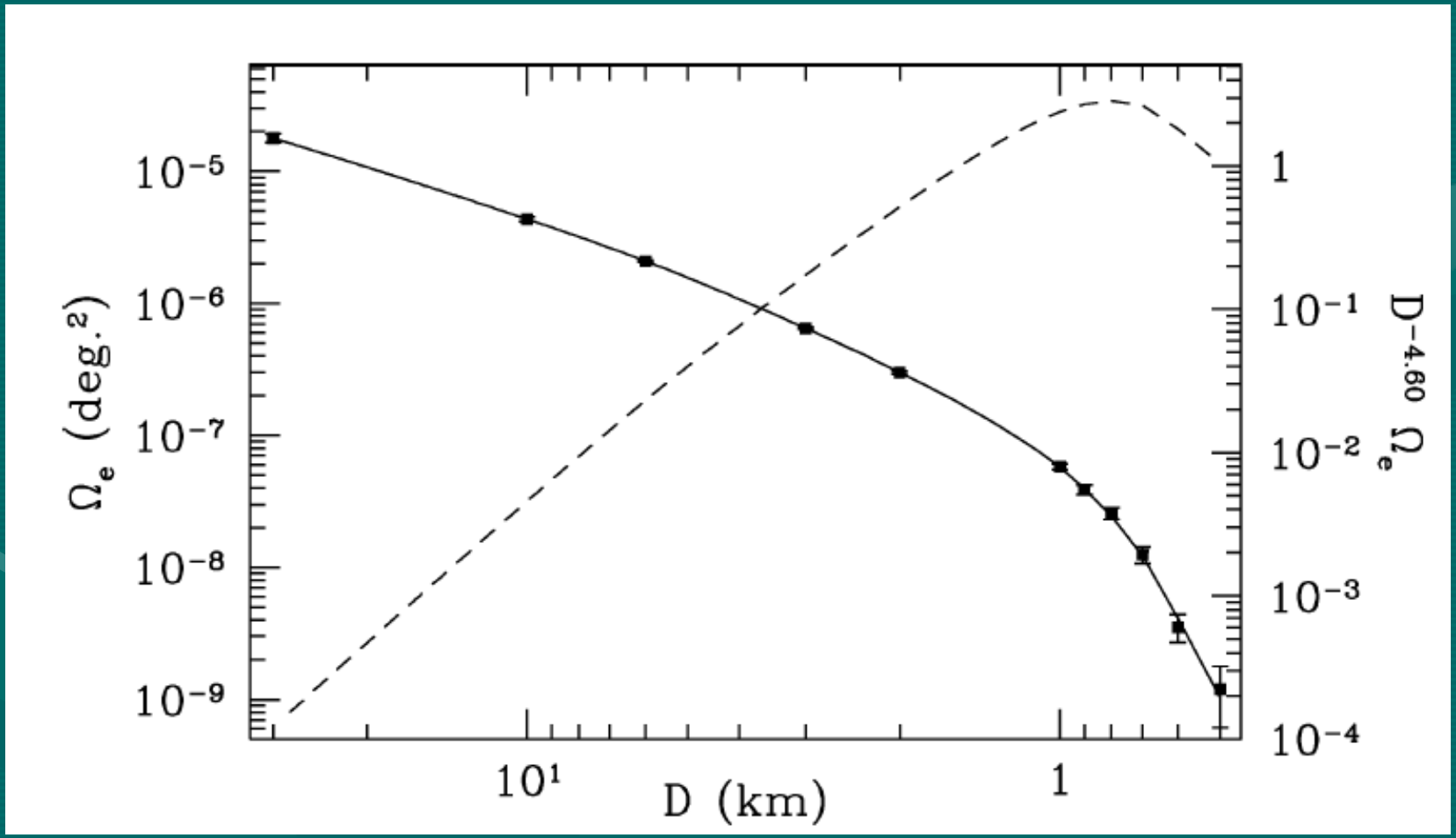
News



References

- http://www.astronomy.com
- http://www.universetoday.com
- http://taos.asiaa.sinica.edu.tw
- http://www.cfa.harvard.edu/press/2008/pr200818.html
- Z.-W. Zhang et al., 2008, ApJ, 685:L157-160
  First results from the Taiwanese-American Occultation Survey (TAOS)

>>Thank you<<


10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
Ω_e (deg.^{2})
10^1
D (km)
1
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
$D^{-4.60}$ Ω_e

$$H = 2[(\sqrt{3}F)^{3/2} + (D/2)^{3/2}]^{2/3} + \theta_* \Delta.$$

$$\Omega_e(D) = w_D^{-1} \sum_j [E_j v_{\mathrm{rel}_j} H_j(D)/\Delta^2],$$

$$N_{\mathrm{exp}} = \int_{D_2}^{D_1} \frac{dn}{dD} \Omega_e(D) dD,$$

a power-law size distribution $dn/dD = n_B(D/28\ \mathrm{km})^{-q}$

$q = 4.60$

$$\frac{N}{T} = \frac{\int_{s_1}^{s_2} \left(\frac{\mathrm{d}N}{\mathrm{d}s}\right) s\, v\, \mathrm{d}s}{d^2\Omega_{\mathrm{A}}},$$

$$\int_{s_1}^{s_2} \left(\frac{\mathrm{d}N}{\mathrm{d}s}\right) s\, v\, \mathrm{d}s = \left(\frac{\mathrm{d}N}{\mathrm{d}\log s}\right)_{s_1<s<s_2} \frac{v(s_2 - s_1)}{\ln 10},$$

and

$$\left(\frac{\mathrm{d}N}{\mathrm{d}\log s}\right)_{s_1<s<s_2} = \frac{d^2\Omega_{\mathrm{A}}}{v(s_2 - s_1)} \frac{N}{T} \ln 10.$$