Kuiper Belt 3.0

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Kuiper Belt 3.0
(beta)

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Kuiper belt 0.0
Kuiper belt 1.0
Kuiper belt 1.1

The diagram illustrates the distribution of Kuiper belt objects (KBOs) based on their semimajor axis and eccentricity. The KBOs are categorized into classical and scattered types. Classical KBOs are found at larger semimajor axes, while scattered KBOs populate the area with higher eccentricities. The Neptune crossing region is marked by the red line, indicating the orbital distances where Neptune's gravitational influence is significant. The 3:2 and 2:1 resonances with Neptune are also highlighted, showing how the distribution of KBOs is affected by these gravitational interactions.
Kuiper belt 1.1
Kuiper belt 1.1

$t=8.0 \times 10^6$
Kuiper belt 1.1
Kuiper belt 1.1

$\text{t}=1.6 \times 10^7$

![Graph showing Kuiper belt characteristics](image-url)
Kuiper belt 1.1

$t = 2.0 \times 10^7$

![Diagram showing the distribution of objects in the Kuiper belt with semi-major axis and eccentricity axes.](image)
Kuiper belt 1.1
Kuiper belt 1.1

![Graph showing eccentricity vs. semi-major axis with t=2.8x10^7 marked.](image-url)
Kuiper belt 1.1
Kuiper belt 1.1

t=4.0 \times 10^7

Eccentricity

Semi-Major Axis (AU)
Kuiper belt 1.1
Kuiper belt 1.1

\[ t = 8.0 \times 10^7 \]
Kuiper belt 1.1
Kuiper belt 1.1

\[ t = 1.2 \times 10^8 \]
Kuiper belt 1.1
Kuiper belt 1.1

t=1.6 \times 10^8
Kuiper belt 1.1

t=1.8x10^8
Kuiper belt 1.1

$t=2.0 \times 10^8$
Kuiper belt 1.2
Dust 1.0
Kuiper belt 1.2; uh oh

Graphs showing the eccentricity over time for Jupiter and Saturn, with observed values indicated.
<table>
<thead>
<tr>
<th>5.2 AU</th>
<th>6.8 AU</th>
<th>8.2 AU</th>
<th>9.2 AU</th>
<th>9.6 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.6 yrs</td>
<td>17.8 yr</td>
<td>23.7 yr</td>
<td>29.5 yr</td>
<td>29.6 yr</td>
</tr>
</tbody>
</table>
Kuiper belt 2.0

J  3:2  2:1  S  5:2

5.2 AU  6.8 AU  8.2 AU  9.2 AU  9.6AU
11.6 yrs  17.8 yr  23.7 yr  29.5 yr  29.6 yr

J  3:2  S  2:1  5:2

5.6 AU  7.3 AU  8.6 AU  8.8 AU  10.3AU
13.2 yrs  19.9 yr  25.2 yr  26.5 yr  33.1 yr
Kuiper belt 2.0

t = 3.20 \times 10^7

Eccentricity vs. Semi-major Axis (AU)
Kuiper belt 2.0
Kuiper belt 2.0
Kuiper belt 2.0
Kuiper belt 2.0

$\text{t} = 3.22 \times 10^7$

![Graph showing the distribution of objects in the Kuiper belt 2.0 model, with semi-major axis (AU) on the x-axis and eccentricity on the y-axis. The graph includes a few scattered points and a dense cluster towards the right side.](image-url)
Kuiper belt 2.0
Kuiper belt 2.0

\[ t = 3.22 \times 10^7 \]
Kuiper belt 2.0

t=3.23\times10^7

Eccentricity

Semi-major Axis (AU)

0 5 10 15 20 25 30 35

0 .2 .4 .6 .8 1
Kuiper belt 2.0

$t=3.23 \times 10^7$
Kuiper belt 2.0
Kuiper belt 2.0

\[ t = 3.24 \times 10^7 \]
Kuiper belt 2.0

t=3.24 \times 10^7
Kuiper belt 2.0
Kuiper belt 2.0
Kuiper belt 2.0

\[ t = 3.26 \times 10^7 \]
Kuiper belt 2.0

$t = 3.26 \times 10^7$

Diagram showing the distribution of objects on the Kuiper belt at a given time.
Kuiper belt 2.0
Kuiper belt 2.0

$t=3.27 \times 10^7$

Diagram showing the relationship between eccentricity and semi-major axis (AU) at $t=3.27 \times 10^7$. The graph displays a scatter plot with data points indicating the distribution of objects in the Kuiper belt.
Kuiper belt 2.0

t=3.20\times10^7
• Dust 2.0
Kuiper belt 2.0 uohoh

The diagram shows the distribution of Kuiper Belt objects (KBOs) based on their semimajor axis and eccentricity. The diagram is divided into two parts: classical KBOs and scattered KBOs. Classical KBOs are concentrated near the 3:2 and 2:1 mean-motion resonances with Neptune, while scattered KBOs are spread out with higher eccentricities. The Neptune crossing region is also indicated, where the inclination of the orbit increases rapidly due to the gravitational pull of Neptune.
Kuiper belt 2.0 uh oh

- Haumea
- Cold classicals are too weird
- Ice/rock fractions
Kuiper belt 3.0, beta

• Need to throw away: collision models, accretion models.
• i.e., all of the input into dust models