

Altrincham and District Astronomy Society

Meeting number **616** held on 4th April 2025 at 8pm

Location: Timperley Village Club

Apologies: N/A

Members Present (in person): 23

The evening began with the Chairman welcoming new attendees to the meeting and commenting on the good attendance.

PRESENTATION

The presentation for the evening was entitled “Jupiter the Bully – and Saturn the Saviour” and was given by David Temperley. He explained that the presentation would cover the story of how the solar system had developed and introduce the two most recent theories involved; the “Grand Tack” and the “Nice Model.”

David began the presentation by showing a few examples of star forming nebula and proto-stellar discs and then used animation to demonstrate how spinning proto-stellar discs were formed from the gaseous nebula. This was year zero for a star and any subsequent planetary system. Detail was provided on what elements/compounds were contained in these discs.

Following on from this, further animations were shown to illustrate the current structure of the solar system, both in layout and relative size of the planets. It was explained that the growth of planets took place in four stages: dust to pebbles, pebbles to planetesimals, planetesimals to protoplanets and protoplanets to full sized planets. Dust particles all rotated the same way and gathered together via hydrostatic forces. The next stage relied on gas turbulence to form fluffy aggregates until gravity and radial drift took over to form planetesimals. There was then a period of gravitational focussing whereby smaller bodies rotated faster and larger bodies slowed down to ensure momentum was maintained resulting in runaway or exponential growth until there were no more small bodies to coalesce into protoplanets. Diagrams as well as animations were used to illustrate this part of the talk as well as how the protoplanets came together to form the rocky inner planets. The concept of the snow line was then introduced and how this resulted in outer planets being so much larger and of a different composition than the inner planets. Photographs obtained from ALMA provided real life examples of planetary discs: it was explained what and how ALMA operated to find these discs and what other objects the array had been able to find.

David then listed some problems that arose from this simplistic model of the formation of the solar system. Why was Mars so small? Where did the water on Earth come from? What caused the late heavy bombardment? How to explain the position of Uranus and Neptune and what about hot Jupiter exoplanets? It was at this point in the presentation that David introduced “Jupiter the Bully” and the concept of the “Grand Tack” dispersing the planetesimals that would have gone into making planets. Jupiter’s influence had got as far as Mars before “Saturn the Saviour” came on the scene pulling Jupiter out of it’s orbit until it fell into a 2:1 ratio with Saturn allowing the other inner rocky planets to continue to form. David then went on to explain the “Nice model”: the two orbiting planets of Jupiter and Saturn, which accounted for 91% of the mass of the solar system (excluding the sun), created havoc with the orbits of Uranus, Neptune and the Kuiper belts objects, resulting in the late heavy bombardment (which it was also hypothesised brought water to the Earth) and Uranus and Neptune migrating to the orbits we see them in today.

David finished his presentation by saying that the “Grand Tack” and Nice Model” however did not fully explain why most exoplanetary systems did not look like the solar system and that there was a recent statistical analysis of Kuiper belt objects orbits suggesting that the Nice model may not be statistically valid.

ITEMS OF BUSINESS

1) Observing Group

- a) The Secretary invited everyone at the meeting to an observing session behind the nearby Athletics club. It would mainly be simple naked eye observing but there were binoculars that people could borrow as well.
- b) Corona borealis was now visible from 9pm onwards – tCrB had still not yet gone nova.

2) Events

- a) It was agreed that the planned open day should be Sat 11th Oct and be an all day event. The Chairman would approach the Village Club to book the whole building.
- b) Sale Lions were holding their usual Family Fun Day in Worthington Park Sale on 15th June (Father's Day) where the Society would be manning their usual stall.
- c) Similarly, the Society would be running their stall at the annual Timperley Country Fair, expected to be sometime in September.

Next meeting

Next meeting 2nd May 2025, speaker Steve Barrett with a presentation entitled "The End of Everything"