

2. Semester report

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PhD program: Astronomy and Space Physics

Supervisors: Tamás Kovács, Áron Süli

PhD Thesis Title: Dynamics and morphology of protoplanetary disks and galaxies

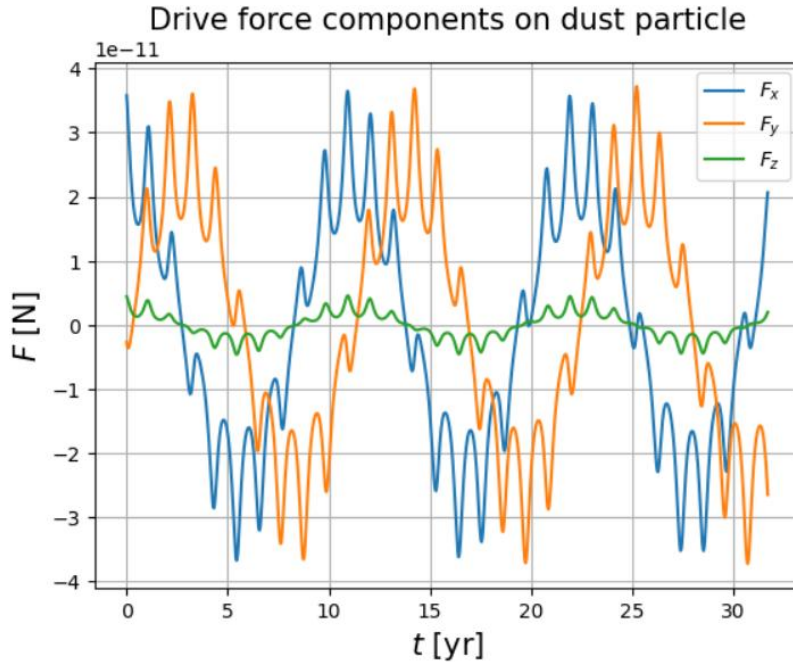
Description of research work carried out in current semester

In this semester with my co-supervisor, Áron Süli, we continued examining 1D one-particle dust sedimentation and grain growth models in protoplanetary disks. Our main result is that the models that take into account grain growth by coagulation during settling give practically the same results, and in a simpler one of these we can analytically express the final grain size as with the initial conditions and disk parameters.

$$s_{\text{fin}} = s_0 + \frac{\sqrt{\pi}\alpha^2 H' f \rho_0}{8\rho_m} \text{erf}(z_0/H)$$

In fact for a large set of initial conditions it can be approximated by just the constant factor before the error function, making it independent of initial conditions.

We also started to create a model that has not just one, but a population of dust particles that settle and can stick if they collide to see how the distribution evolves. Furthermore, we began making a model about how the gravity of an already formed planet with some inclination might make a settled pebble oscillate, which could lead to further growth.



Publications

As I mentioned in my previous report, with my co-supervisor, Áron Süli, we are planning to publish in Fizikai Szemle, then in A&A about models of dust sedimentation and grain growth. We are a bit behind schedule as we wanted to finish the articles and send them to the publishers in this semester, but we have not finished them yet. Originally we planned that we would publish 2 articles in Fizikai Szemle, now we are considering publishing it in one part depending on the publisher's preference. The two articles / one longer article is about 80% ready.

Conferences in current semester

I participated in the Bálint Érdi 80 Conference with a 20 minute contributed talk about dust sedimentation and coagulation in protoplanetary disks.

Studies in current semester

In the second semester I signed up for 3 subjects:

- FIZ/5/004, Astrostatistics II. (lecturer: Lajos Balázs), grade: good (4)
- FIZ/5/027, Dynamics of stellar systems I. (lecturer: Lajos Balázs), grade: good (4)
- FIZ/5/045 The formation of planets and planetary systems (lecturer: Zsolt Sándor), grade: TBA