

01160354 — INTRODUCTION TO ASTROPHYSICS AND COSMOLOGY

LECTURES

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*These notes were typed during the 2026 winter semester in the Technion.
The lectures were given in Hebrew and were live-translated by me to English.
The document is provided as is and likely contains many errors.*

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1 INTRODUCTION

Since astrophysics is a very wide subject we won't be able to dive deep on each subject. The course is introductory so we'll be skipping some things like full solutions to integrals and the such.

1.1 *So what is astrophysics?*

Astrophysics and Cosmology could be broken down into:

- Physics of stars
- Solar systems (planets, comets, ...)
- ISM (Inter-Stellar Medium), IGM (Inter-Galactic Medium)
- Cosmology (development, the big bang, dark energy/matter)
- Exotic objects (black holes, neutron stars, white dwarfs, ...)
- Relativity (gravitational waves, gravitational lensing)
- Galaxies (types, development, active galactic nuclei, quasars)
- Explosions (novas, supernovas, gamma ray bursts)

and the methods used to research those things include

- Observations
 - Telescopes (IR, radio, xray, gamma rays, ...)
 - Gravitational waves
 - Neutrinos
 - Other particles (via probes)
- Labs
- Computer simulations (hydrodynamics, N-body simulations)
- Analytical theory

We'll focus mostly on the analytical theory, but we'll mention the others too.

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