

CFD-MHD Initiative



Chi Yuan, ASIAA

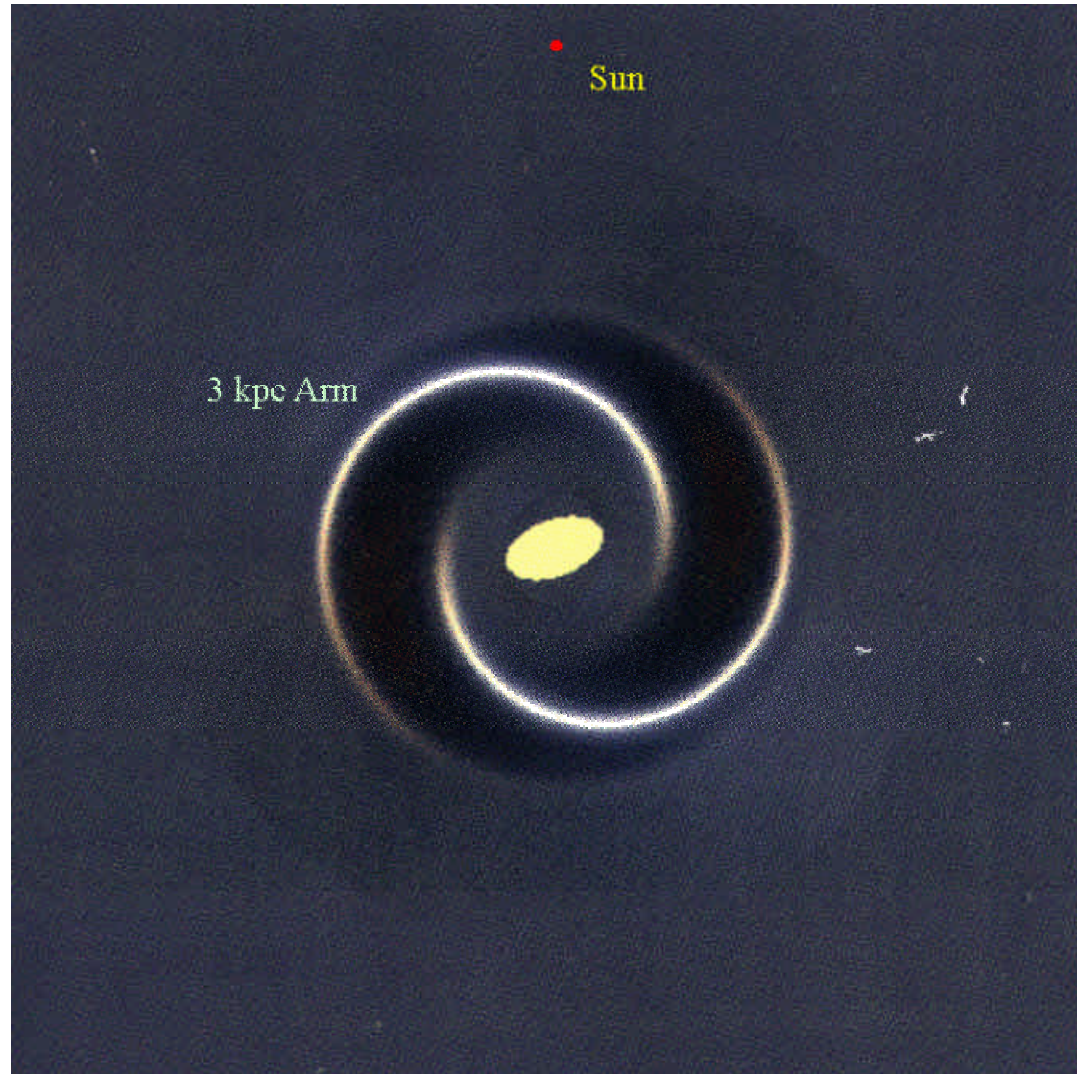
I-Liang Chern, Taida Math

Tai-ping Liu, ASIM

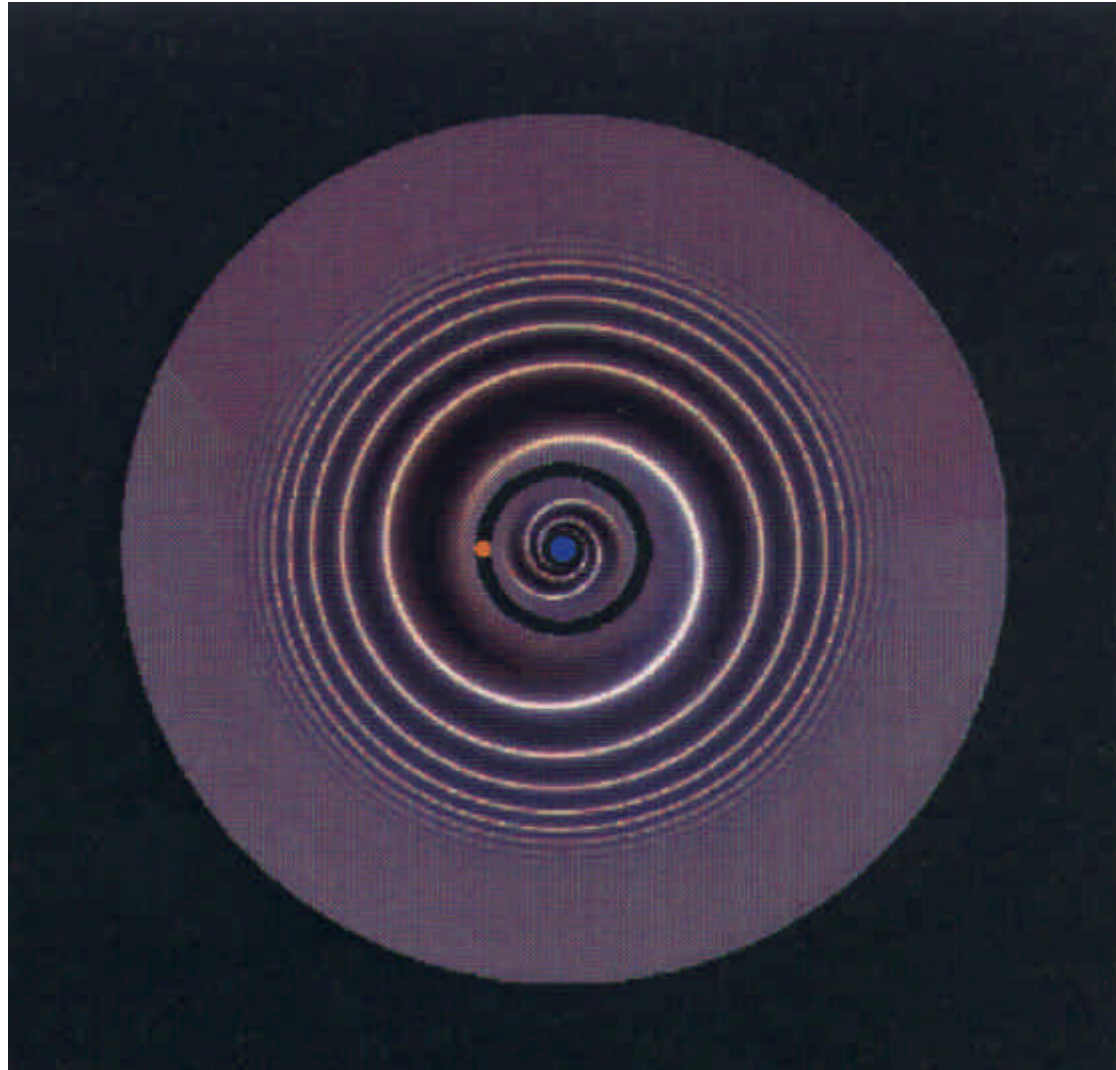
A 3-year Key Project of Academia Sinica: to Develop a High-Performance CFD-MHD Code

- ✍ Two-dimensional gas-dynamical problems with self-gravitation to simulate evolution of gas-dust disks in galaxies or proto-stellar disks, under a periodic forcing.
- ✍ Two-dimensional (axisymmetrical) MHD problems with self-gravitation to simulate the collapse of a magnetized rotating clouds and the jet formation.
- ✍ Two-dimensional and three-dimensional MHD problems with self-gravitation to simulate magnetized gas disks in spiral galaxies, to study their stability, structure, and evolution.

Bar-driven Spiral Density Waves



Spirals Excited at Resonances by Giant Planet in a Protostellar Disk



Strategy



- ✍ To develop our own code based on the relaxation method. (ASIAA)
- ✍ To incorporate the best available schemes, such as PPM, into our code, after our comparative studies. (Taida-Math)
- ✍ To improve the theoretical basis for the relaxation method. (ASIM)
- ✍ To use multi-grid method, adopted mesh refinement, and grid generation idea. (ASIAA, Taida)
- ✍ To operate a big visitor program to catch up the newest development in the world.

Manpower

✍ ASIAA: Chi Yuan, Sienny Shang, Tony Allen, David



Yen, Lupin Lin

✍ ASIM: Tai-Ping Liu, Mo-Hong Chou

✍ ASCC: Danny Shieh

✍ Taida: I-Liang Chern, 2 grad students

✍ NTHU: Wei-Cheng Wang

Resources



- ✍ ASCC 32 nodes 128-processor IBM machine. (IBM Power-3 chips, 192 GFLOPs)
- ✍ 32-64 PC cluster (Taida, Math-Physcis)
- ✍ Several high-performance workstations and PC's (ASIAA)
- ✍ NCHC high-performance machines for production runs (400 GFLOPs)

Future: Center for Computational Sciences

- ✍ A center in the future Astronomy-Mathematics Building to be formed jointly by Taida-Math, Taida-Astrophysics, ASIAA and ASIM, hopefully supported by NRC and AS
- ✍ Permanent staff: 5, Postdocs: 4-6, Visitors: 5, Students: 5-10
- ✍ 2005?