

M O D E S T :

MOdeling **DE**nse **ST**ellar systems

or

MOdifying **EX**isting **ST**ellar codes

<http://www.manybody.org/modest.html>

STELLAR EVOLUTION:

Individual Stars [tracks]

Population Synthesis [tracks]

Pop. Syn. including binaries [tracks ?]

Pop. Syn. w. interacting binaries [life !]

Stellar Dynamics \longleftrightarrow Stellar Evolution

in stars:

the reservoir of nuclear energy

far exceeds the thermal energy

in star clusters:

the reservoir of binary binding energy

far exceeds the thermal energy

Stellar Dynamics and Stellar Evolution Interface:

```

real*8 m1,m2,newmass,newY,newZ
integer newstar
...
m1 = getMass(id1)
m2 = getMass(id2)
newmass = m1+m2
newY = (getY(id1)*m1 + getY(id2)*m2)/newmass
newZ = (getZ(id1)*m1 + getZ(id2)*m2)/newmass
newstar = CreateStar(newmass,newY,newZ)

```

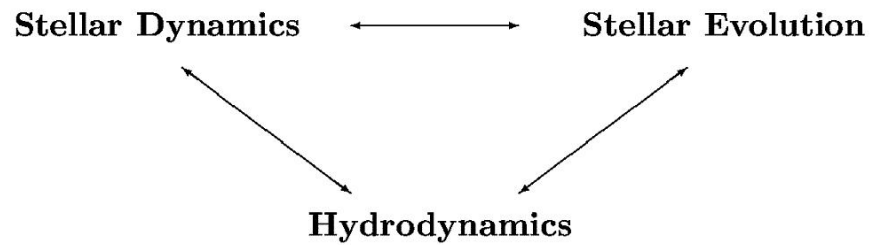
for further details, see:

MODEST-1: Integrating Stellar Evolution and Stellar Dynamics

P. Hut, M. Shara, S. Aarseth, R. Klessen, J. Lombardi,

J. Makino, S. McMillan, O. Pols, P. Teuben, R. Webbink.

2003, *New Astronomy*, to appear (astro-ph/0207318)



a star as:

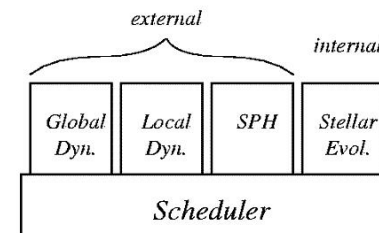
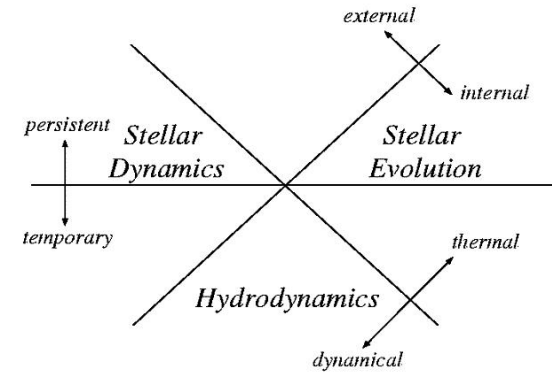
point mass + stellar evolution black box

first becomes:

SPH cloud + stellar evolution black box

then merger remnant:

point mass + stellar evolution reinitialized



Stellar Dynamics / Hydrodynamics / Evolution Interface:

The function

```
integer function
  CollideStars(r,v,
    mProfile1,rProfile1,
    PProfile1,rhoProfile1,
    chemicalProfiles1,
    mProfile2,rProfile2,
    PProfile2,rhoProfile2,
    chemicalProfiles2,
    numShells1,numShells2,
    numChemicals)
```

accepts input arguments declared as follows.

```
real*8 r(3), v(3)
integer numShells1,numShells2,
        numChemicals
real*8 mProfile1(numShells1),
        rProfile1(numShells1),
        PProfile1(numShells1),
        rhoProfile1(numShells1),
        mProfile1(numShells2),
        rProfile2(numShells2),
        PProfile2(numShells2),
        rhoProfile2(numShells2),
        chemicalProfiles1(numShells1,
                           numChemicals),
        chemicalProfiles2(numShells2,
                           numChemicals)
```

for the latest news on MODEST:

Modest-2: A Summary

A. Sills, S. Deiters, P. Eggleton, M. Freitag, M. Giersz,
D. Heggie, J. Hurley, P. Hut, N. Ivanova, R. Klessen, P. Kroupa,
J. Lombardi, S. McMillan, S. Portegies Zwart, H. Zinnecker

2003, *New Astronomy*, submitted (astro-ph/0301478)

MODEST Working Groups:

Star formation	Ralf Klessen
Stellar evolution	Onno Pols
Stellar dynamics	Rainer Spurzem
Stellar collisions	Marc Freitag
Simulating Observations of Simulations	Simon Portegies Zwart
Data structures	Peter Teuben
Validation	Douglas Heggie
Literature	Melvyn Davies

MODEST Work-shops:

MODEST-1	New York, USA, June 17-21, 2002
MODEST-2	Amsterdam, Holland, Dec. 16-17, 2002
MODEST-3	Melbourne, Australia, July 9-11, 2003
MODEST-4	Lausanne, Switzerland, Jan. 12-14, 2004
MODEST-5	Hamilton, ON, Canada, Aug. 11-14, 2004
MODEST-6	Heidelberg, Germany, Jan. 17-19, 2005
MODEST-7	Evanston, IL, USA, Aug. 29-31, 2005

Past modeling approach

back-of-envelope processes:

such as tidal capture

targeted at specific observations

Future modeling approach

whole-cluster modeling:

a handful of free parameters

constrained by all observational data