Star clusters form in cold, dense molecular clouds. The formation of these star clusters can have a significant impact on their natal clouds through heating and ionizing radiation. Recent studies have suggested that the formation of just a few clusters can disrupt the entire cloud over a short time-scale [1]. Simulations of radiative feedback from clusters are difficult, however, due to the large number of stars formed. We present a model for the radiation output of a cluster to be used in hydrodynamical simulations with FLASH.

**GOAL:** Create an observationally consistent model for the radiation output of a star cluster to examine radiative feedback effects in realistic molecular clouds.

**Theoretical Model**

- An initial clump mass is converted to stars by random sampling of the Chabrier IMF
- Star formation efficiency of 20% per freefall time is used, and sampling is done every tenth of a freefall time
- Initial gas clump allowed to accrete mass at a constant rate to understand average model behaviour (will not be constant in simulations)
- Each generation of new stars is drawn from total available gas (ie. no accretion onto individual stars) and no stellar deaths
- Track the mass of all stars formed and total luminosity as a function of time to compare to observations

**Results**

- Our model can reproduce the SFR of local star-forming regions and the number of ionizing photons from stellar evolution codes [4]
- SFR nearly linear with clump mass
- Two regimes:
  a) Initial reservoir dominated → decreasing SFR and more high mass stars (blue curve)
  b) Mass accretion dominated → increasing SFR and less high mass stars (black curve)

**Differences between regimes diminish with increasing final clump mass**

**Next Steps**

- Model has been implemented into cluster sink particles within AMR code FLASH (Figure 1)
- Coupled to a raytracing scheme to treat radiative transfer
- Currently running a turbulent, 10000 Solar mass simulation including radiative feedback
- Extract: Accretion rates and timescale, cluster mass function, IMF as a function of time, and ionizing flux

References: