

Guide to Density Assignment

at level=L > mldd assign density:

- for all particles that sit in levels $\geq L$
 - this is how mass assignment works, cells at lev1 only get density from particles at lev \geq lev1
 - here you are assigning density to level L, but smoothed at level mldd, and then redistributed to lev1 appropriately
- particle size = size(mldd)
- assign density on mldd
- go down to all the children of those cells to assign density to level

- particle size mldd
- find "single-particle-density" on mldd
 - mass gets assigned to 8 "children" on level mldd (still)
 - icell0 is zeroth each primary child on level mldd
 - it is assigned "mass_assigned"
 - it's youngest child assigned a fraction of that mass = $\text{mass_assigned} / 8^{(L - \text{mldd})}$
- start by going down from icell0 to all children at level L
 - ic is a youngest you are currently looking for
 - start at level mldd, ilev=0,
 - cells_below_ilev is used for finding what octant the youngest child lives in
 - index_to_child is the child you want of the cell at pseudo-level ilev
 - when you step down a level, icid becomes the new child in the octant you focused on
 - the child at index_to_child becomes the next parent
 - ilev++
 - if the child doesn't exist then none of the other children of the old icell will exist
 - skip ic=icnow to icnow+ $8^{(\text{high_levels} - \text{failed_ilev})}$
 - if you make it to high_level assign mass
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 - if icell is not refined then keep going
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- example:
 - ic=13, high_levels=2, ilev=0, (total high cells =64)
 - #cells below 0=8
 - index to child =1
 - icid=13-8=5
 - icell=child(icell0,1)
 - ilev=1
 - ----- success!

- #cells below=1
- index to child=5/1
- icid=5-1*5=0
- icell=child(icell,5)
- ----->mass assigned
- ----- fail! no children
- $ic += 8^{(\text{highlevel} - \text{ilev})} = 21$ ok that wouldn't be good, but you should never get that point because siblings will have already failed, and advanced past you
 - there should be an assert in here.

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