Radiance 4.0 Improvements

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Enhancements

- New `rvu -n` option for multiprocessing
  - Works with `rad -N`, `objview -N`
- New control variables in `rad`
- Annual simulation for complex fenestration (fancy windows)

RVU in Parallel

- Linear speed-up with number of processors

    - first renderer to use raypcalls.c

    - slight delay in command response

    - -n 1 behavior same as before

- Process count changed via "new" command

RAD Settings

- Variables "oconv," "mkillum" and "pfilt" may now specify alternate program path as first argument

- Variables "rpict" and "rvu" added for renderer-specific options and paths

```
# Use my hacked rvu with 2 CPUs:
rvu = /usr/mybin/rvuGW1 -n 2
```

Annual Simulations with BTDF Windows

- Development funded by LBNL and Southern California Edison

- Development work managed by Eleanor Lee at LBNL

- SCE project managed by Heschong-Mahone Group

  - Lisa Heschong, Mudit Saxena, and Tim Perry

What Was Added

- Created genklemsamp utility to generate Klems samples for rtcontrib

  - first Perl script in Radiance

- Added klems_int.cal to bin samples

- Added reinhart.cal for sky samples

- Created gentregvec utility to compute sun/sky contribution vector

- Wrote dctimestep matrix multiplier

Basic Steps

- Phase I: Exterior Analysis **D**

  - Use `genklemsamp` with `rtcontrib` to track flux from sky to façade

- Phase II: Interior Analysis **V**

  - Use `rtcontrib` to track flux from window interiors to room surfaces

- Phase III: Time Step for each **s, T**

 - Use `dctimestep` to get **i = VTDs**

Bug Fixes

- Fixed accuracy issues with new BTDF support in `mkillum`, thanks to Rick Mistrick, Maria Konstantoglou, Eleanor Lee and others at LBNL

- Improved sampling of circular and spherical sources with much help from David Geisler-Moroder

  - `-dj 1` now works reliably*

    *except in the case of non-parallelograms

Round Sources (1)

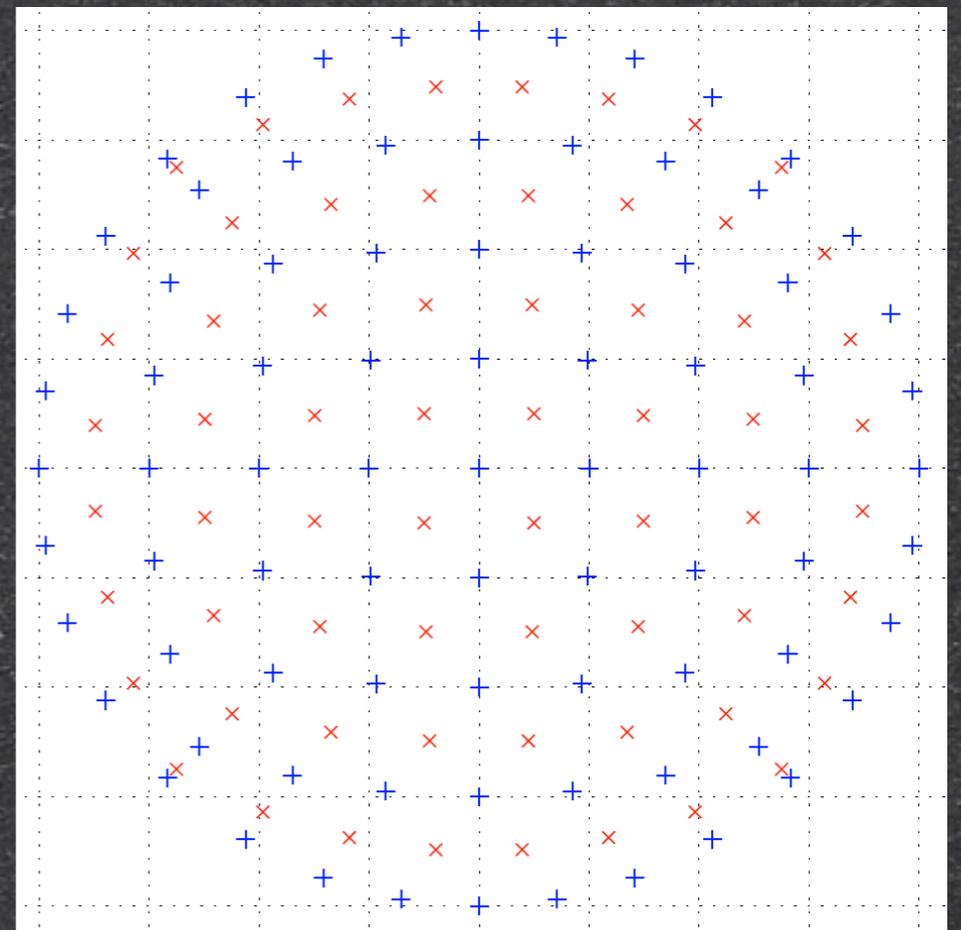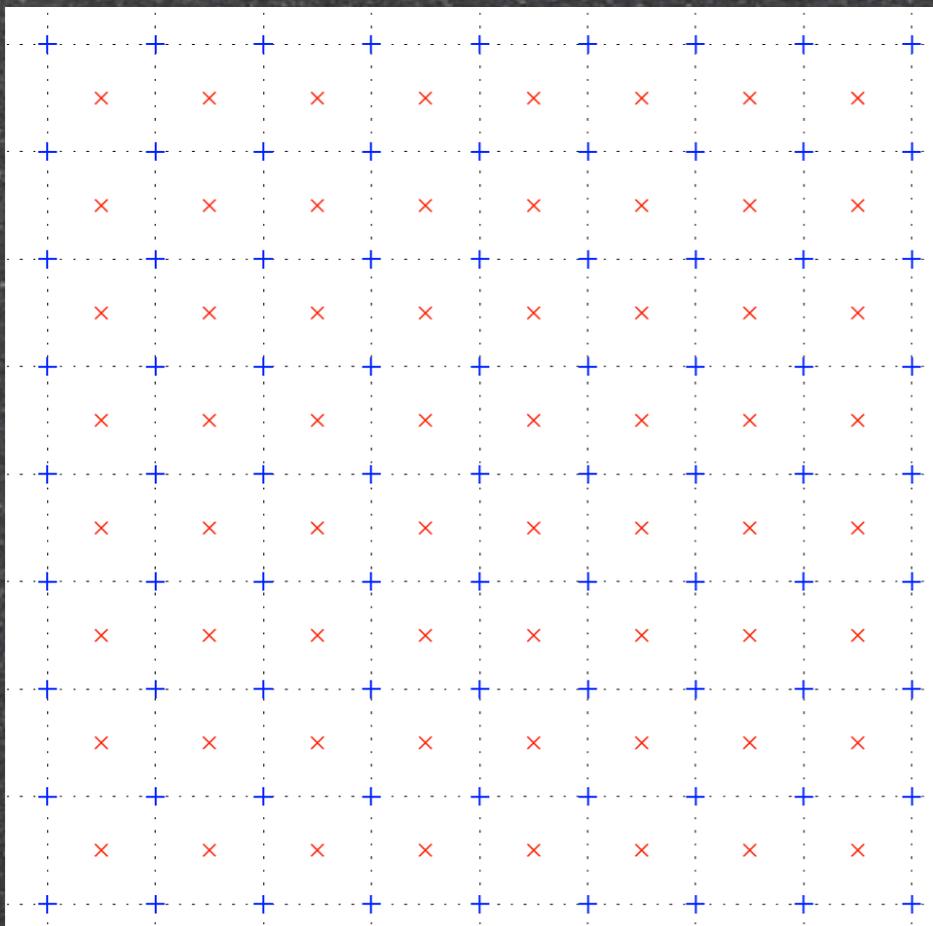Old Sampling with -dj 1:
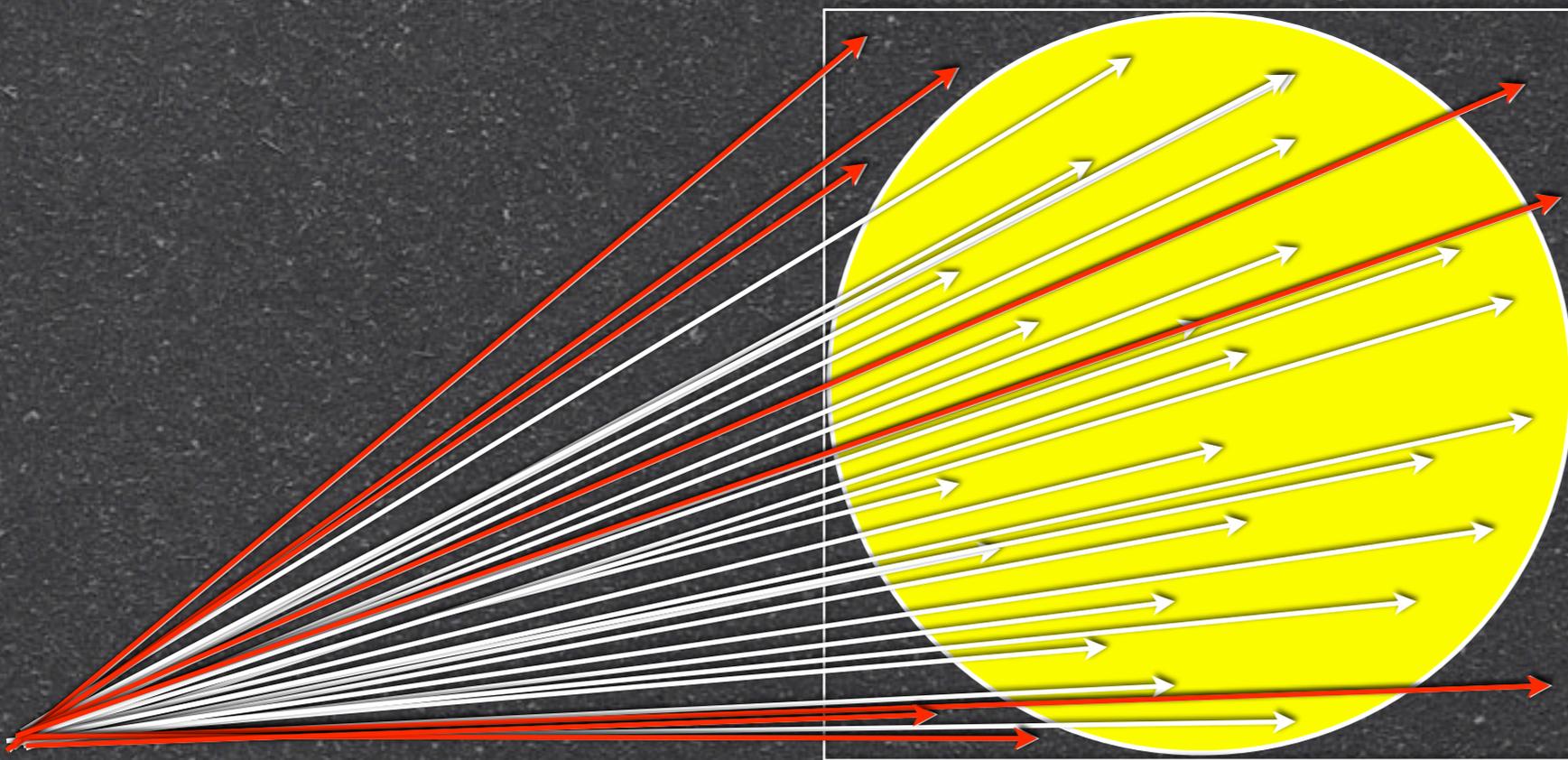
rpict: warning - aiming failure...
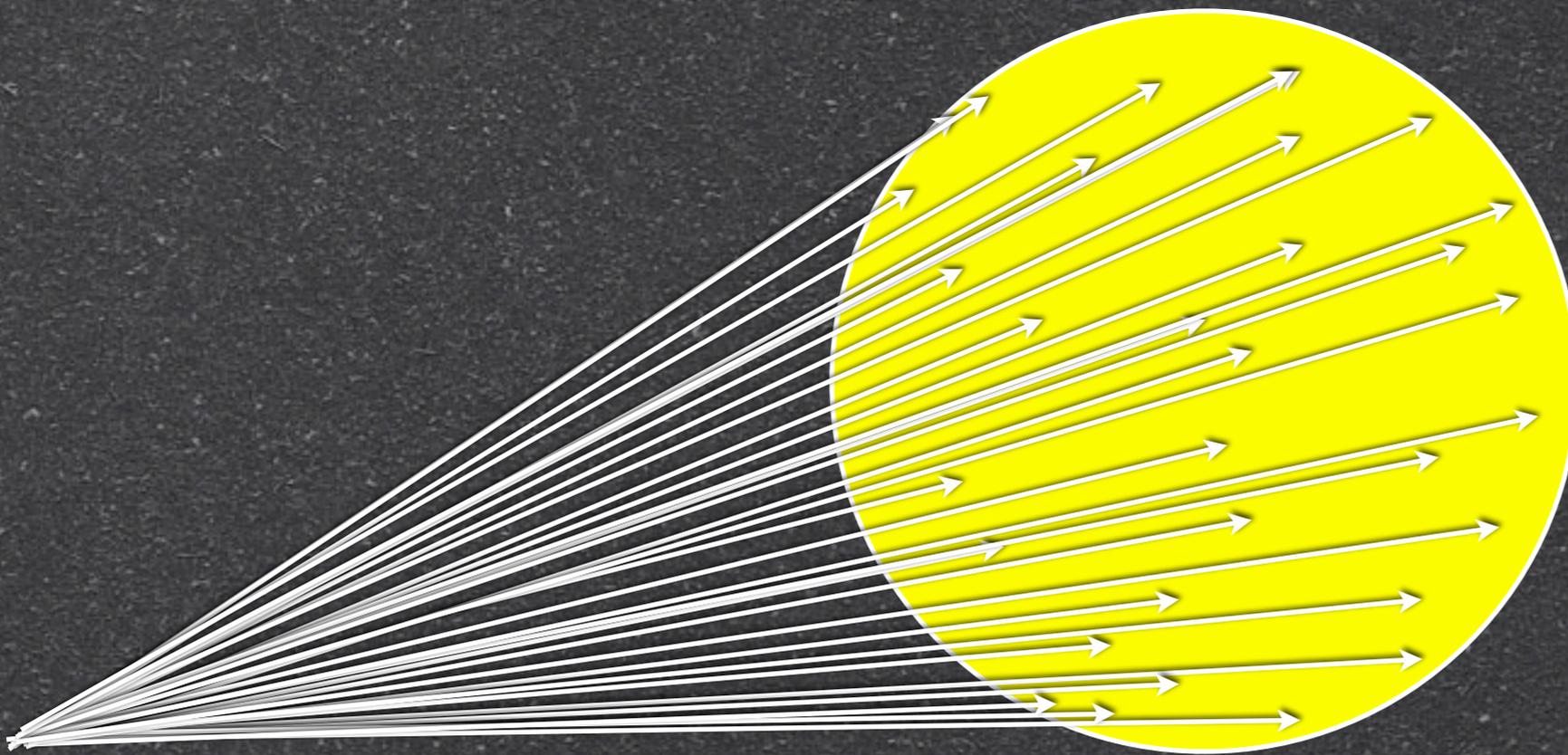
Round Sources (2)

Philip Nowell map of circle to square:

$$x' = x\sqrt{1 - \frac{y^2}{2}} \quad \text{and} \quad y' = y\sqrt{1 - \frac{x^2}{2}}$$

Round Sources (3)

New Sampling with -dj 1:

Imperfect solution, but errors are usually negligible

Round Sources (4)

- Works for:
  - Disk sources
  - Distant sources
- Similar trick for spherical sources
- Polygonal sources unaffected

Other Changes

Changed picture suffix convention from ".pic" to ".hdr" in all scripts

Added gendaylit to distribution

Release 4.0 Overdue

- It's more or less ready, just looking for time to throw it together (soon?)

- The HEAD release is fairly stable and I encourage users to send feedback