Catalog Comparison of PSPS Extended Source Parameters with SDSS DR9

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Durham, Jan. 2013

- ***Motivation*** - direct comparison of PSPS and SDSS catalogs

- Sample selection / SAS region

- Kron/PSF magnitudes (Object table)

- Petrosian quantities and concentration (StackApFlux table)

- Model fitting (deV, exp, Sersic)

- ***Much is useful already***, but a few model fits need debug

  - Generating oddball (PSPS ≠ SDSS) subsample for testing

- ***Suggestions*** for PSPS schema + interface improvement

  - Galaxy 'view' - deepest stack static sky, separate time stuff

  - PSS direct-request from PSPS query, plus stamp bundling with static sky extended source catalog

- Static, low-spatial frequency sky improvements

- Motivation

  - At summer consortium meeting, I showed independent image analysis of stacks (SE deblending/masking + galfit)

  - John Lucey's presentation to DRAVG + [next] here

  - ☑ Pixel detrending successful esp. with uber-cal

  - *Suggest direct comparison of PSPS and SDSS catalogs as efficient means to find any bugs in extended source phot*

  - No new galfitting from me today, simple matching of PS1 and SDSS quantities

- Sample selection + measurement collecting within SAS region

- Galaxy sample obtained via DR9 CASjobs query

  - bright (r<19) objects in Galaxy view

  - confirmation with SDSS spectrum

 - retained regardless of neighbors (to test deblend)

  - RA/DEC box
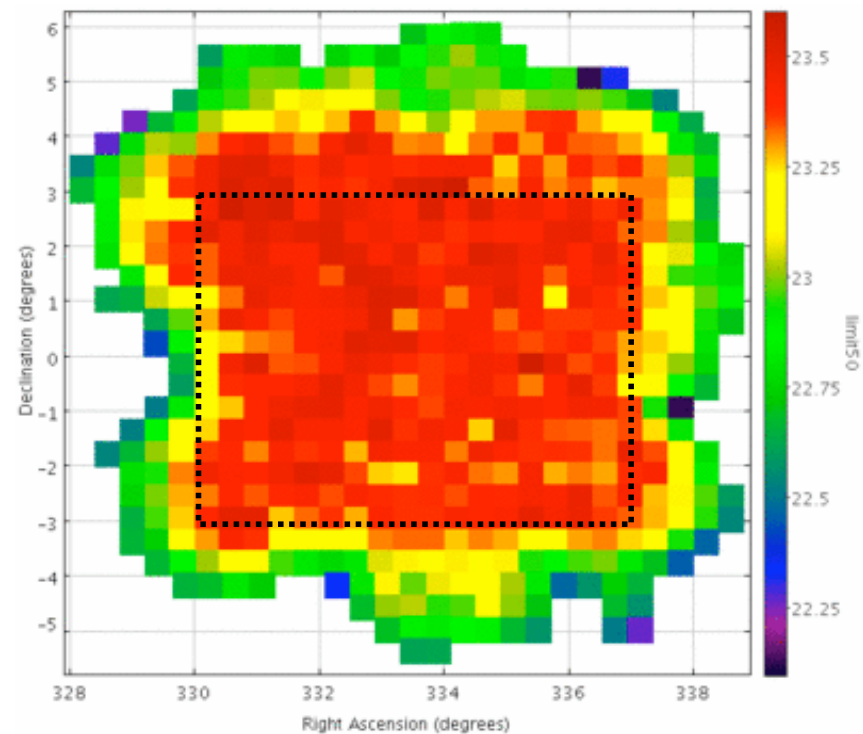
- Sample selection + measurement collecting within SAS region

  - Pan-STARRS Science Interface used to obtain PSPS quantities with a single Query Builder step

  - JOIN on Object, StackApFlx, and StackModelFit tables

  - Later pruned because unique objid's have multiple associated StackModelFit rows (different filters... stacks?)

  - Cross-matching of SDSS and PSI output done using the Vizier fast X-match tool online -- VOtable

    - Matched in [SDSS to PSI] direction, 1" distance

    - 3180 matched with r-stack avail
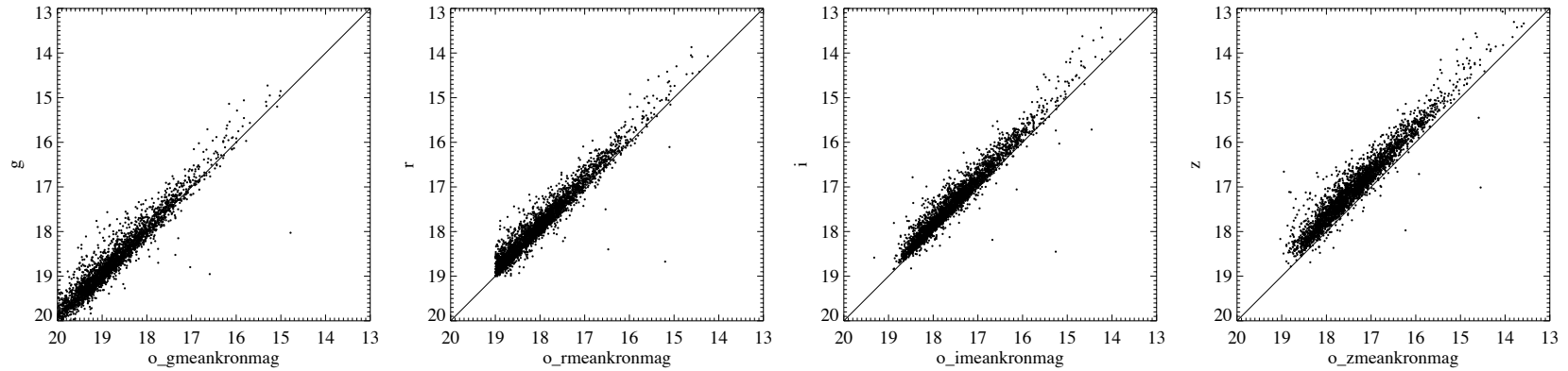
- Kron magnitudes (in PSPS object table)

- SDSS modelmag vs. PS1 mean mags (griz bands)

  - mean Kron mags are slightly too faint (~0.5 mag)
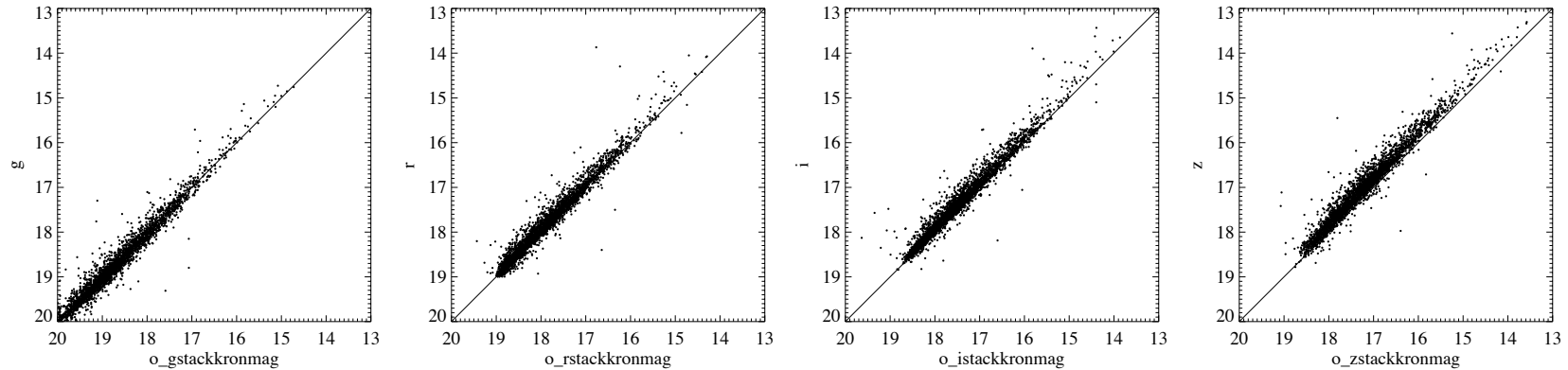
- Kron magnitudes (in PSPS object table)

- SDSS modelmag vs. PS1 stack mags (griz bands)

  - *tighter corr. and offset fixed except bright end / z*

    - *bright end effect of sky subtraction?*

  - will soon extend to wider LAP coverage and measure scatter and median offset in mag bin

 - could be used now for color-color, CMD selection while extended source fitting is refined

- Star/Galaxy sep. with Kron/PSF mags (in PSPS object table)

  - Approp. Kron-PSF cut varies with mag
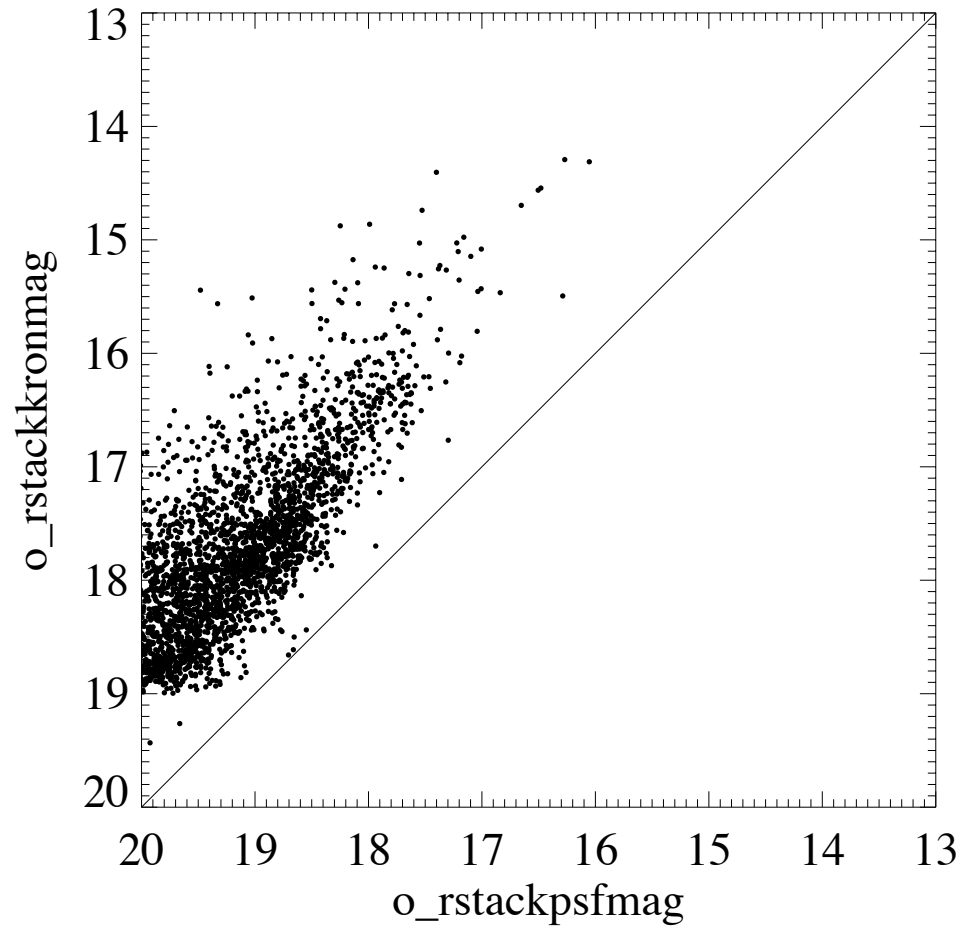
- Petrosian radii from PSPS StackApFlux table

- sa_petradius

    - *"sometimes"* quantized values

    - lower than DR9 estimates by few arcsec, up to 2x at small values

   - stored as pixels, not arcsec (*suggest a standard choice*)
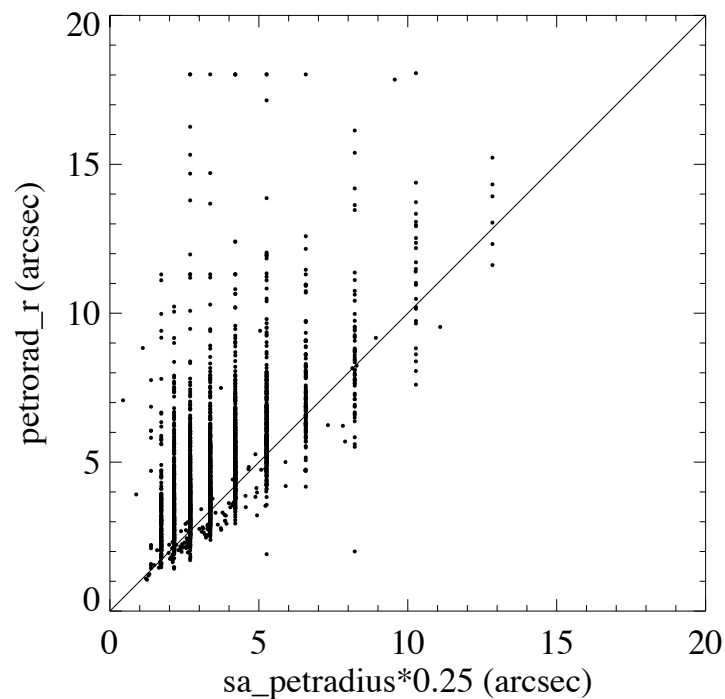
- Petrosian radii from PSPS StackApFlux table

- sa_petr50

  - not quantized

  - better agreement with DR9 than sa_petradius

  - few outliers same sense as sa_petradius
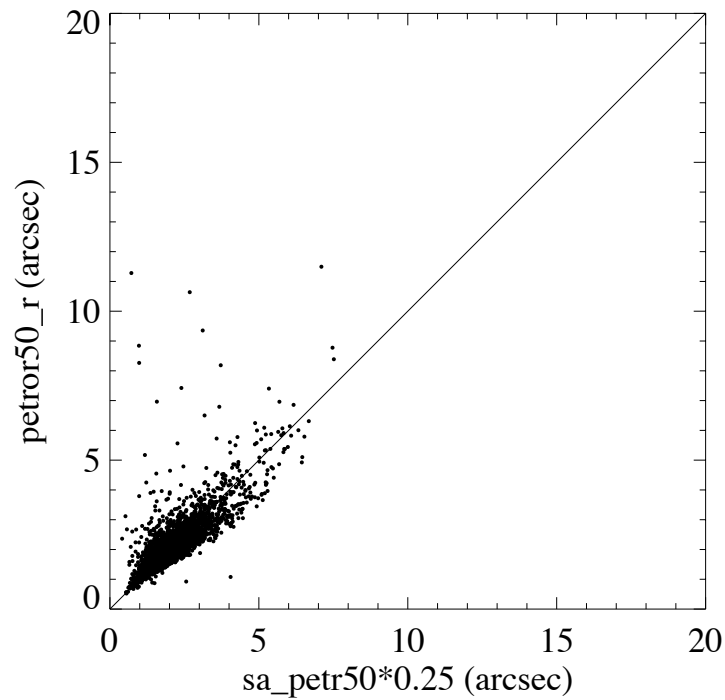
- Petrosian radii from PSPS StackApFlux table

- sa_petr90

  - pseudo quantized

  - outliers same sense as sa_petradius

- *BEST DR9 agreement = use sa_petr50*
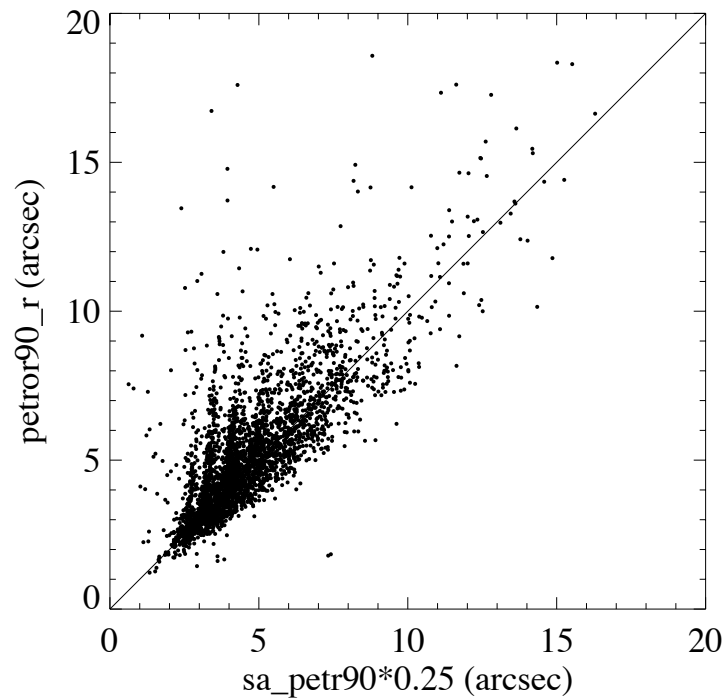
- Concentration index constructed with Petrosian radii from PSPS StackApFlux table (sa_petr90/sa_petr50)

  - correlation with DR9 but PSPS C higher due to petr90
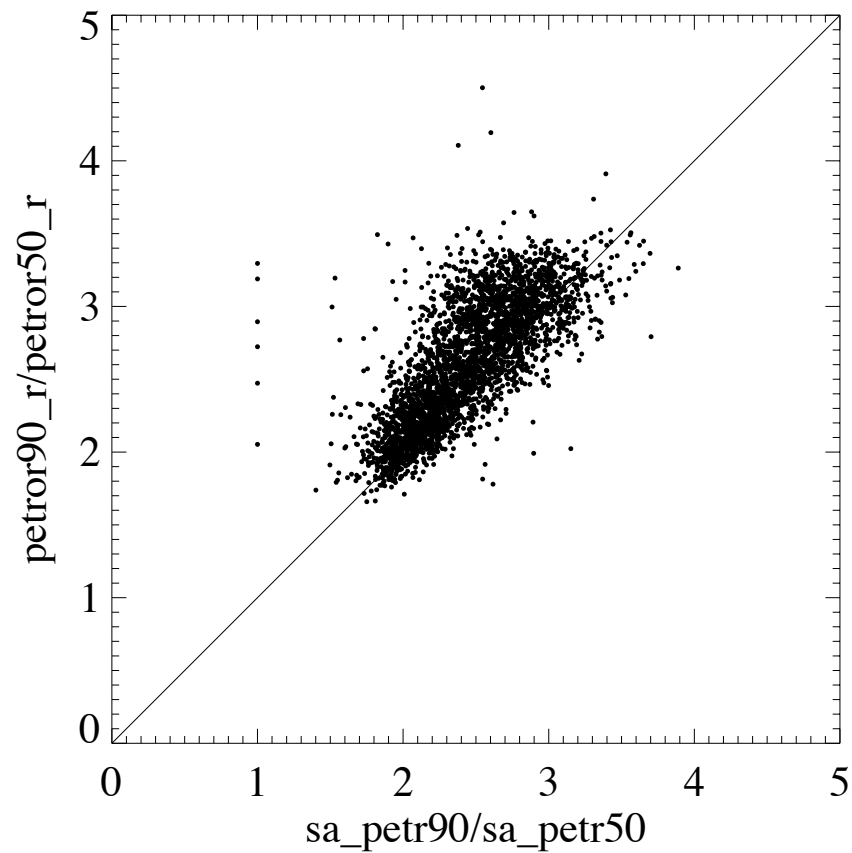
- Concentration index constructed with Petrosian radii from PSPS StackApFlux table (sa_petr90/sa_petr50)

- evident relation between DR9 fracdeV_r and C

- handful of PS points at C=1
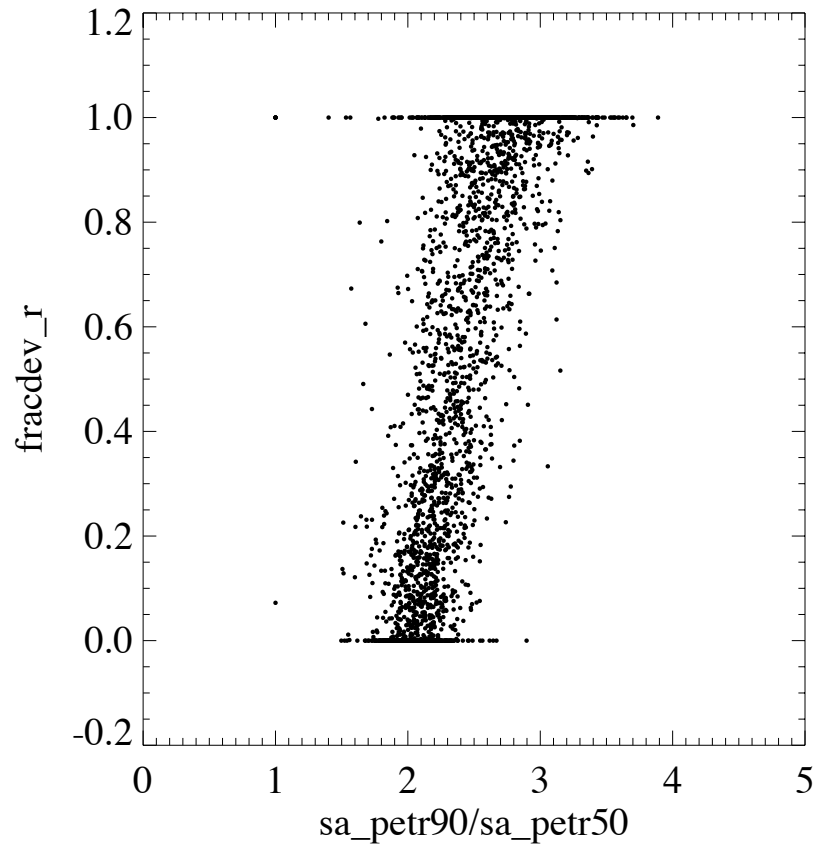
- Model fitting (deV, exp, Sersic) results are stored in separate PSPS table (StackModelFit = smf_*)

  - issues with single row per objid / SQL finesse needed?

  - PSPS smf table currently only has model flux not mag

- Formulation of stored values in static sky .cmf and PSPS

  - Radii, Sersic index

- Sersic fits are not done by SDSS pipeline...

  - comparison of Sersic parameters done here against NASA-Sloan Atlas (Blanton et al. online)

  - adding NYU-VAGC Sersic comparison now

- smf_sernu (note odd format in smf table)

  - correlated with fracdev_r

  - PS Sersic index limited to 1...4

  - issue at high vals?? where n=4 but low fracdev
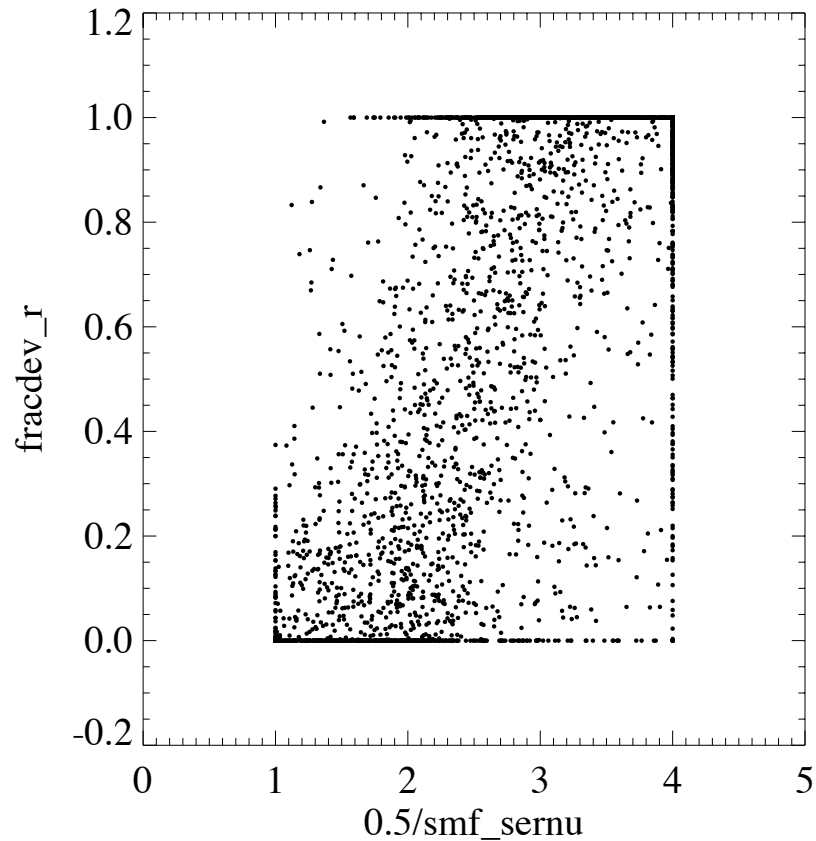
- PS1-only correlation promising between Sersic n and C
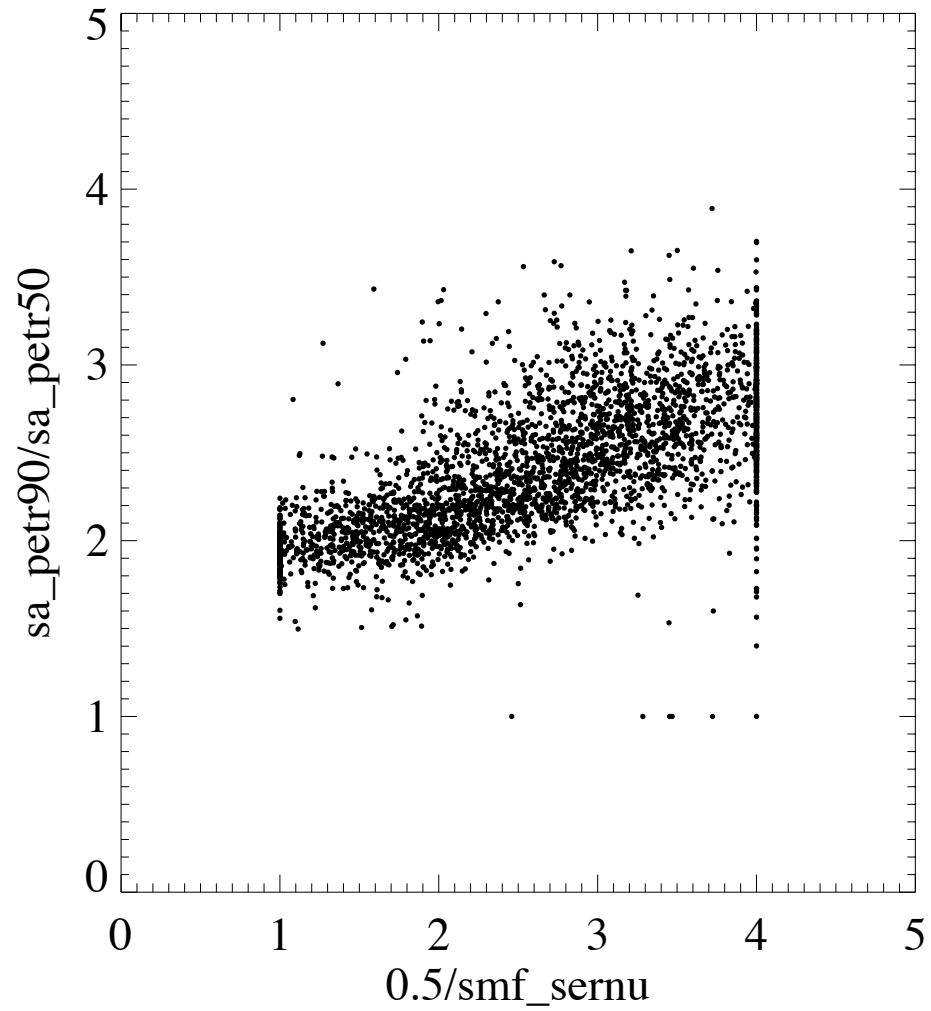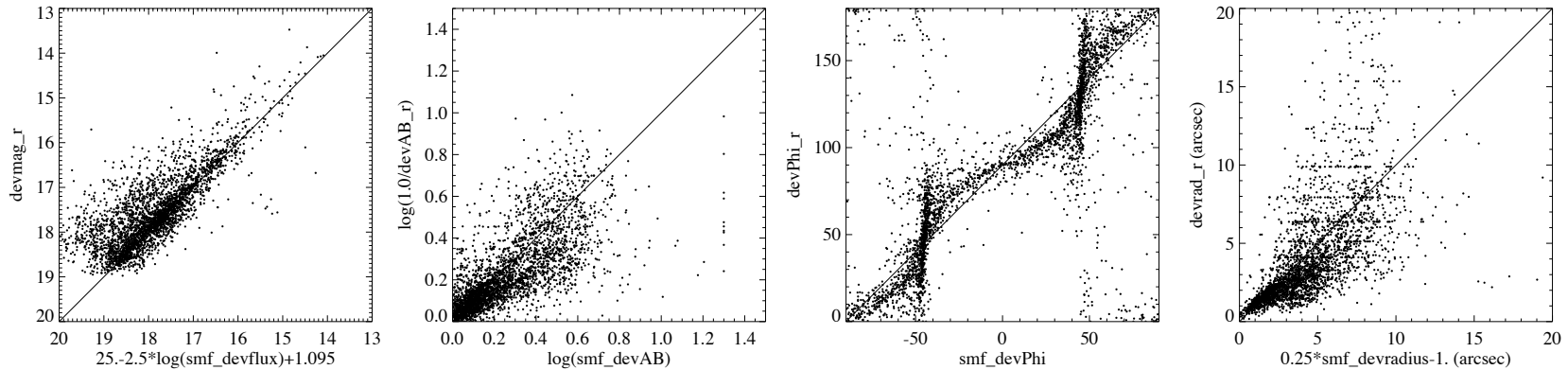
- deVaucouleur model fitting results

  - est. smf_deVmag still has prominent cloud of points for which PS1 is too faint, plus a few in the other sense

  - smf_deVAB (general agreement, scatter at high vals, upper limit of 20 seen in PS)

  - smf_deVPhi (from radians, ripples, 45° too common)

  - smf_deVrad?? -- unclear what is being stored
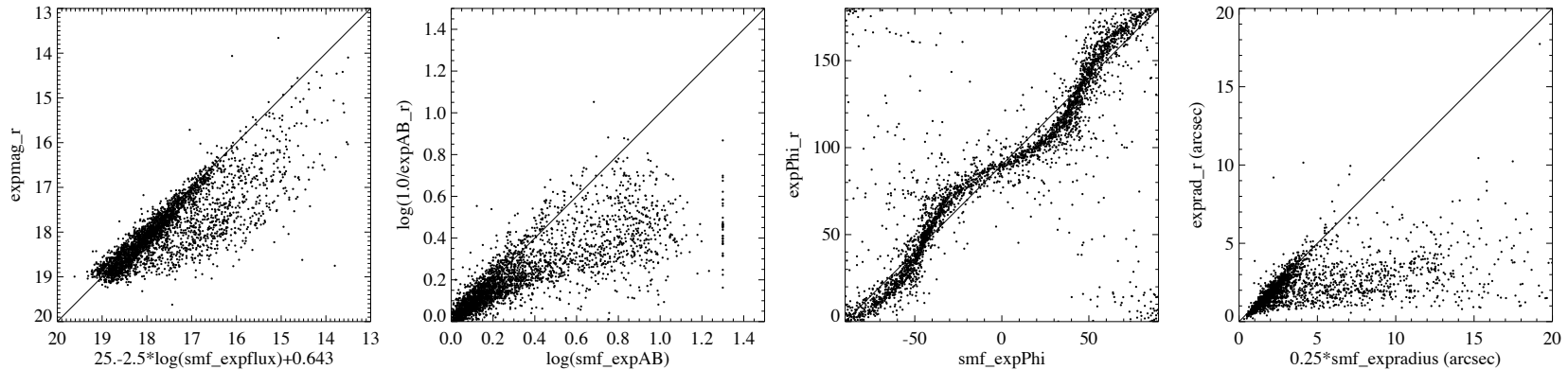
- exponential model fitting results

  - est. smf_extmag still has opposite problem (PS too bright)

  - smf_expAB (PS ABratio higher, esp at large values)

    - influence of better seeing than SDSS?

  - smf_expPhi (from radians, sinusoidal ripples, no 45˚ issue)

  - smf_exprad (outliers with large PS size)
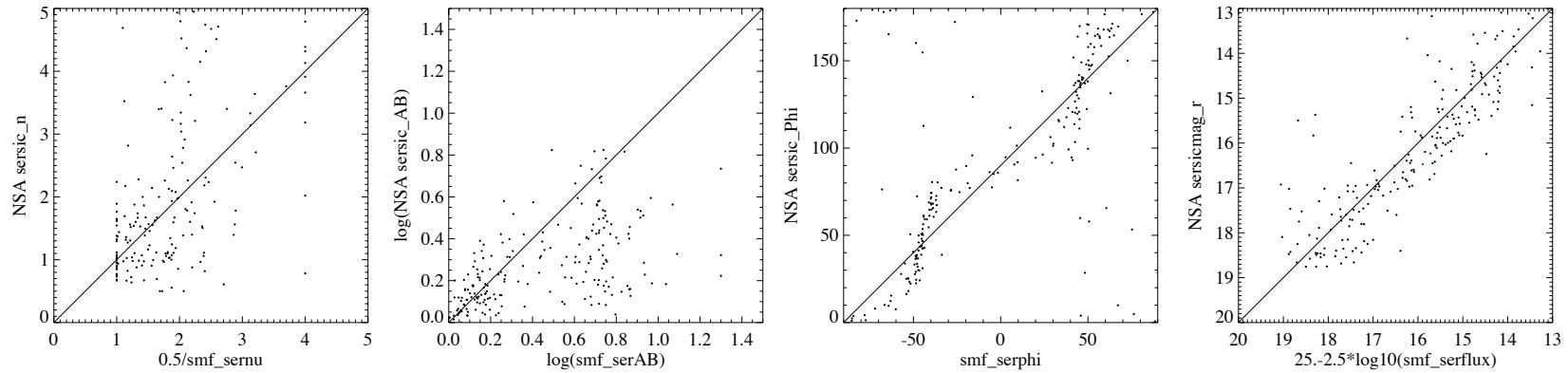
- Sersic model fitting results (NSA comparison ~ 200 galaxies)

  - basic n agreement but need more galaxies (from VAGC)

  - smf_serAB shows same trend as smf_expAB

  - fair (not great) correlation of Sersic mags in r-band

- Making oddball (PSPS ≠ SDSS) subsample for further testing

  - discrepant deV and exp mags

  - also: C=1; esp. low sa_petrad; n=4 but low fracdeV; 45°

- Suggestions for PSPS schema + interface improvement

  - Galaxy 'view' similar to SDSS (Star version too...)

    - deepest stack static sky measures in all bands

    - separate out time dependent measures

  - PSS direct-request from PSPS query

  - Stamp bundling with static sky extended source catalog

- Static, low-spatial frequency sky improvements being made by Chris Waters and IPP team -- thanks!
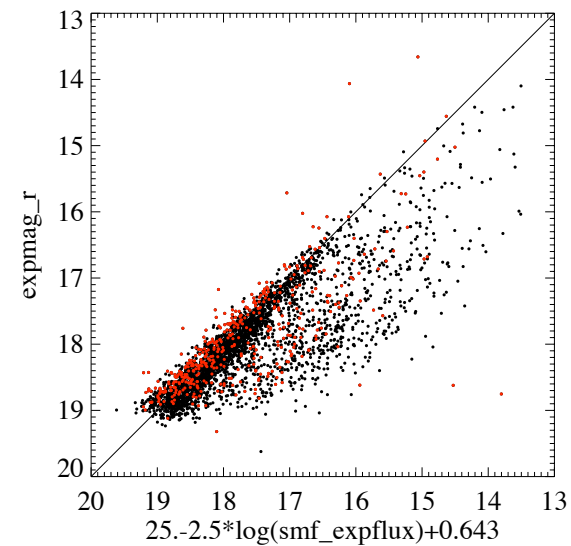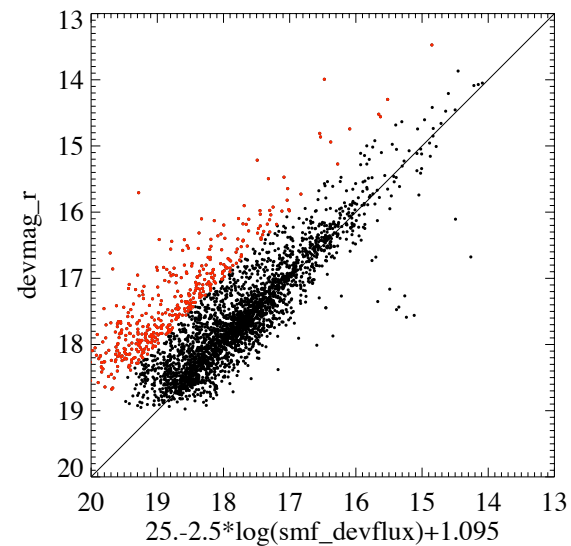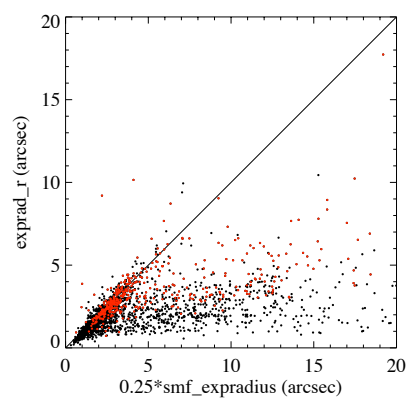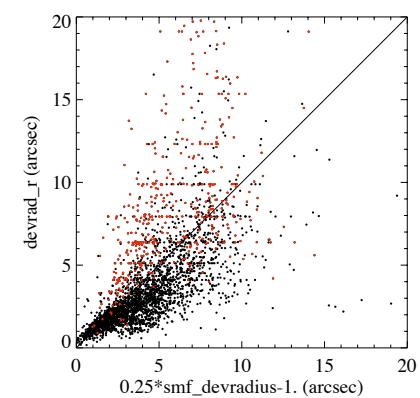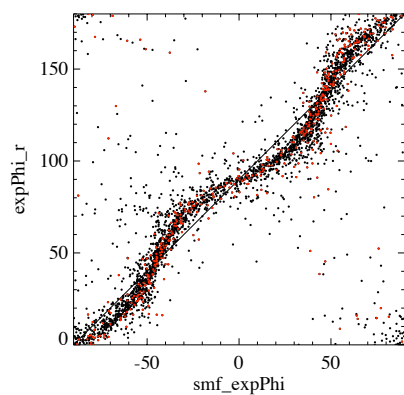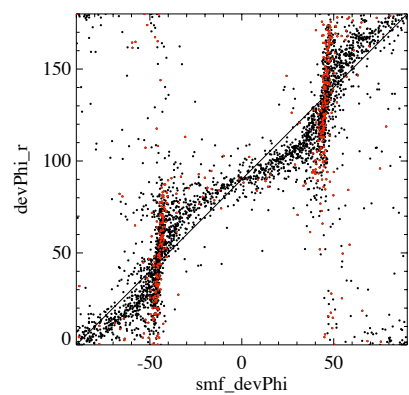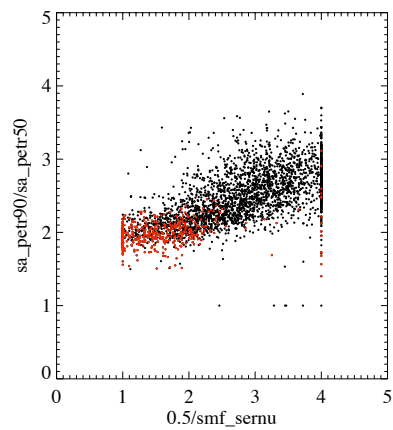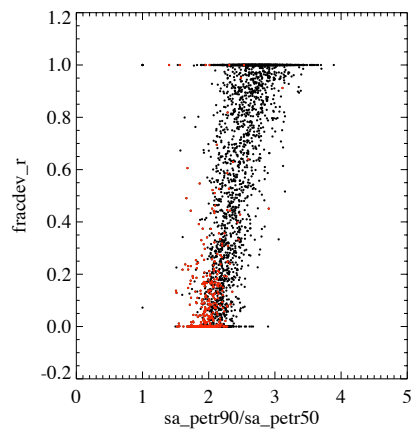
- discrepant (too faint) deV mags
- 15% of galaxies

- Making oddball (PSPS ≠ SDSS) subsample for further testing

  - discrepant deV and exp mags

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