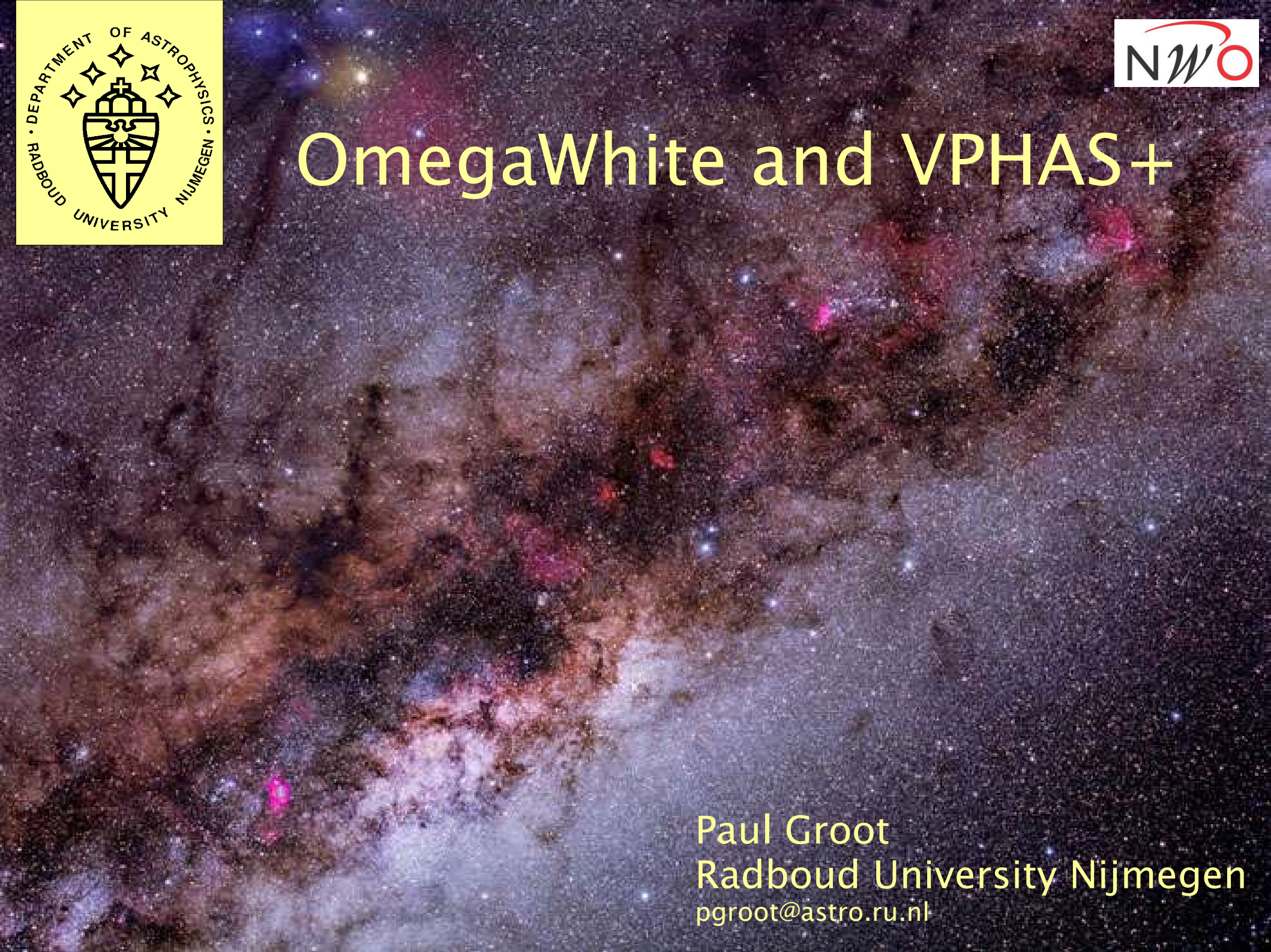

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OmegaWhite

- Part of the Dutch GTO time
- Aim: to discover Galactic Population of ultracompact binaries
- Sky coverage: 150 sq. degr. @ b=±5

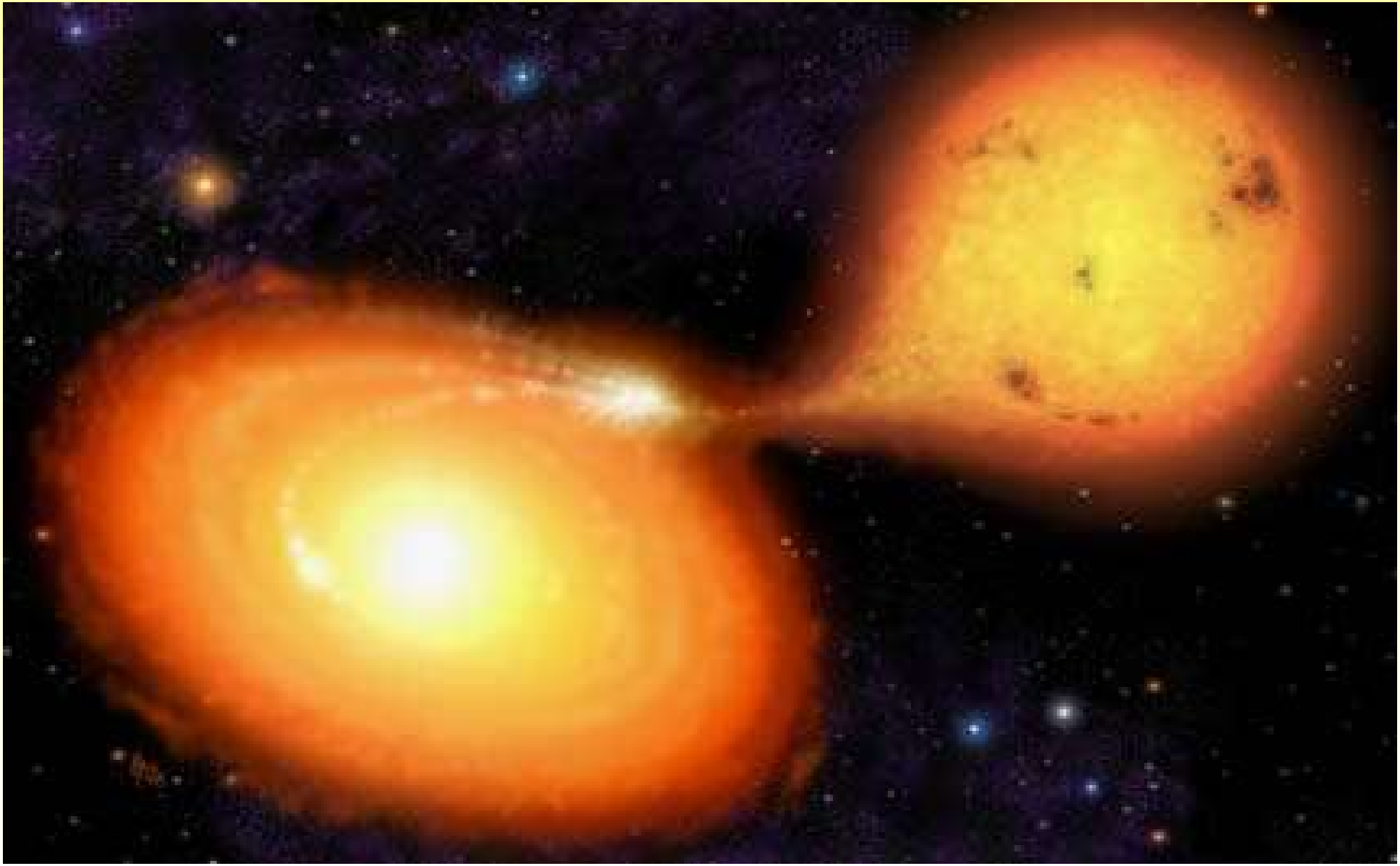
Ultracompact Binaries

- Binaries with two evolved components (white dwarfs, neutron stars, black holes, brown dwarfs)

- Orbital periods < 1 hour.

- Often: mass-transfer → Hα & He I emission

Ultracompact Binaries (Graphic)



Why?

- Final stages of stellar evolution
- Progenitors of Supernovae Type Ia
- Gravitational wave sources with LISA
- Physics of ultra-low mass-transfer rate disks

Known population

- AM CVn stars: 17
- Ultracompact X-ray binaries: 11
- Detached Double WDs: 8
- Evolved Cataclysmic Variables: ~20

AIM ΩWhite:

- AM CVn stars: ~250
- Evolved CVs: ~50
- Detached short period: 10

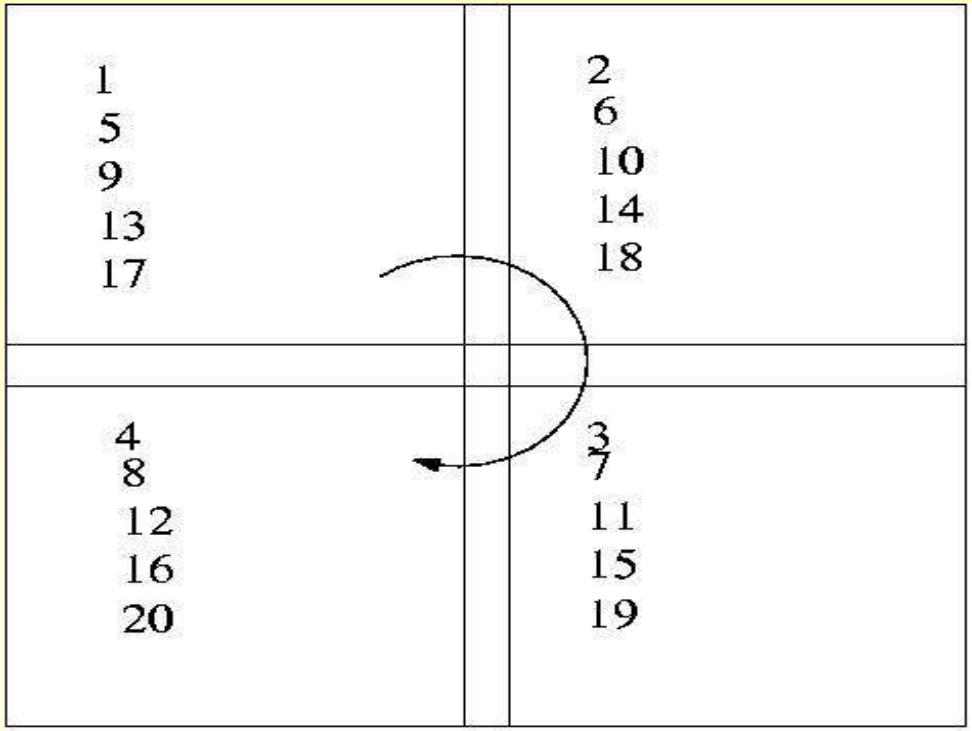
How?

- Broad-band colours: u',g',r',i' (from VPHAS+)
- Narrow band imaging: Hα (VPHAS+) & He I
- Photometric Variability: for each field 2 hours stretch with 5 minute sampling.
- Proper motions

Time Variability

- One observation: 40 seconds in g'
- Rotating pattern of 3 or 4 pointings
- Repeat cycle for 2 hrs total.
- Differential precision: ~ 3 mmag!

Time Variability

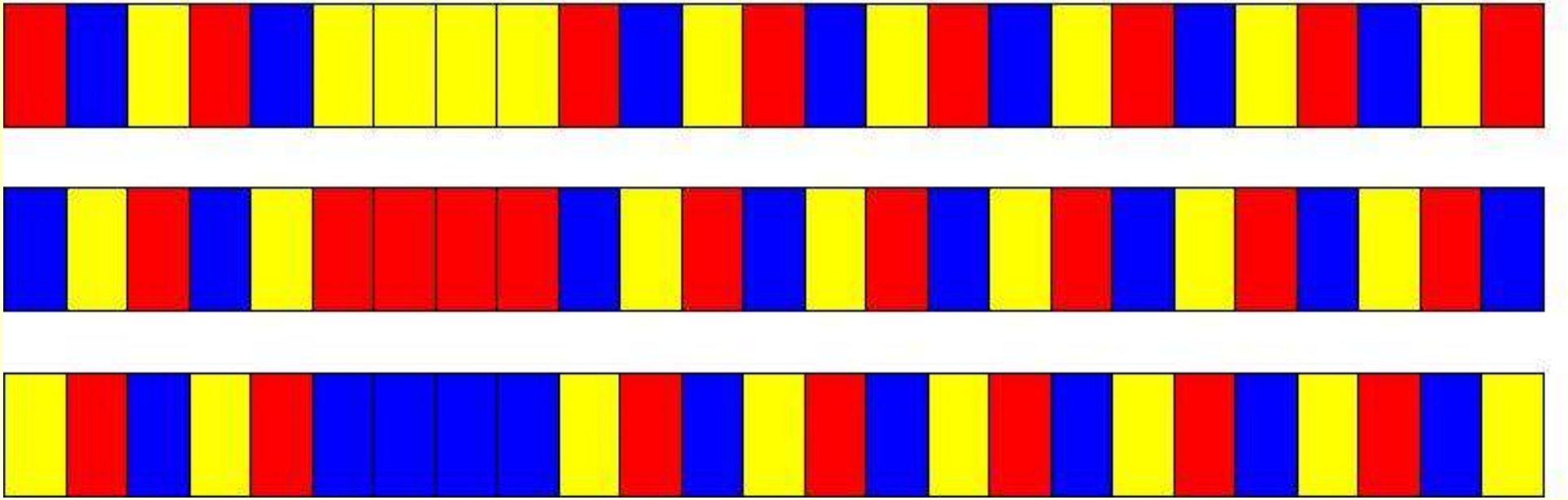


or

1 6 7 12 13		2 5 8 11 14		3 4 9 10 15 16
1 4 7 10 13		2 5 8 11 14		3 6 9 12 15
1 5 9 13 17		2 4 6 8 10 12		3 7 11 15 19

Time Variability

3 fields, 40s exposure + 55 sec overhead = 75 exposures in 2 hours
each field is exposed 25 times.



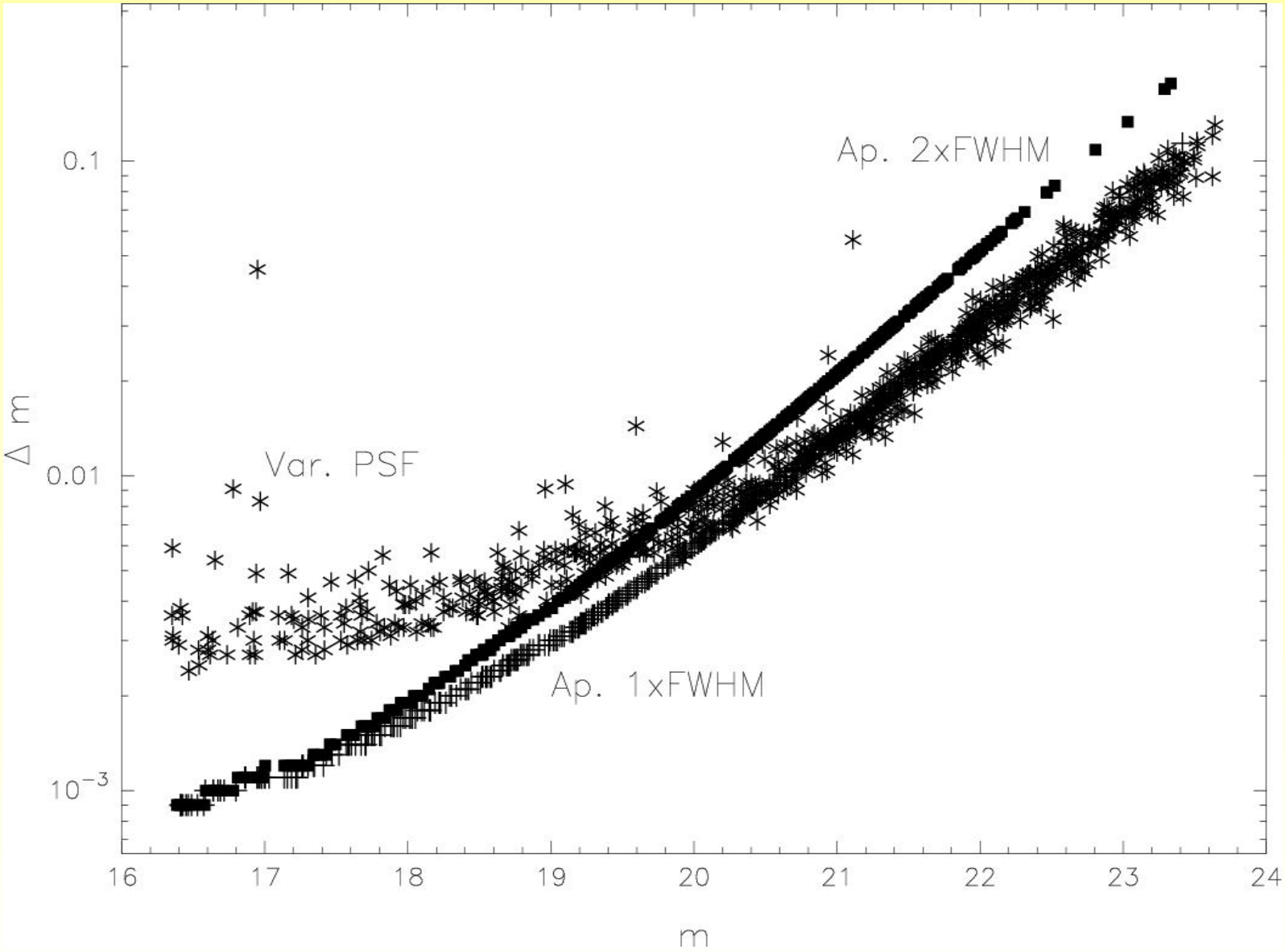
Photometric Variability

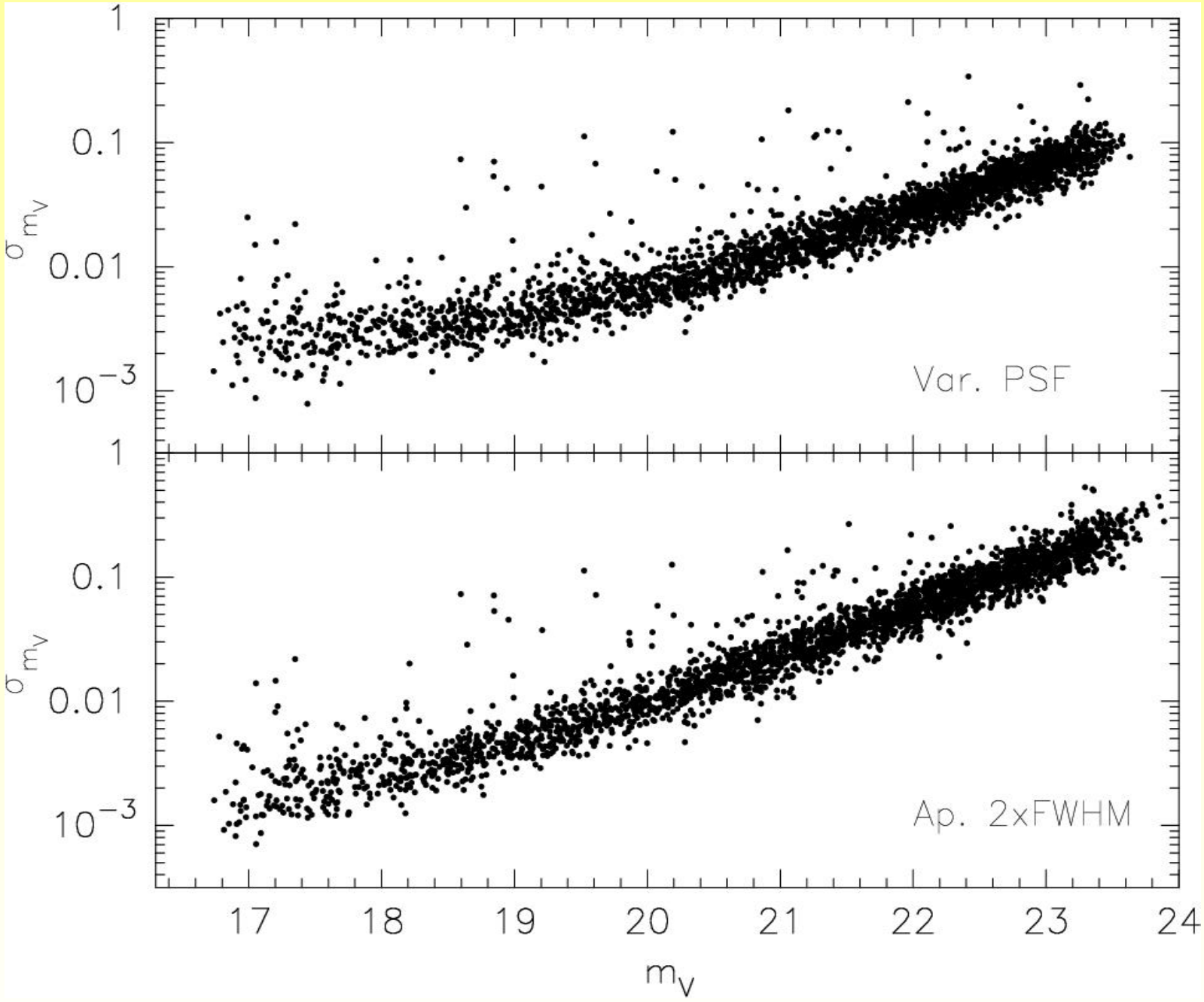
- We want to achieve level of ~ 3 mmag in differential photometry

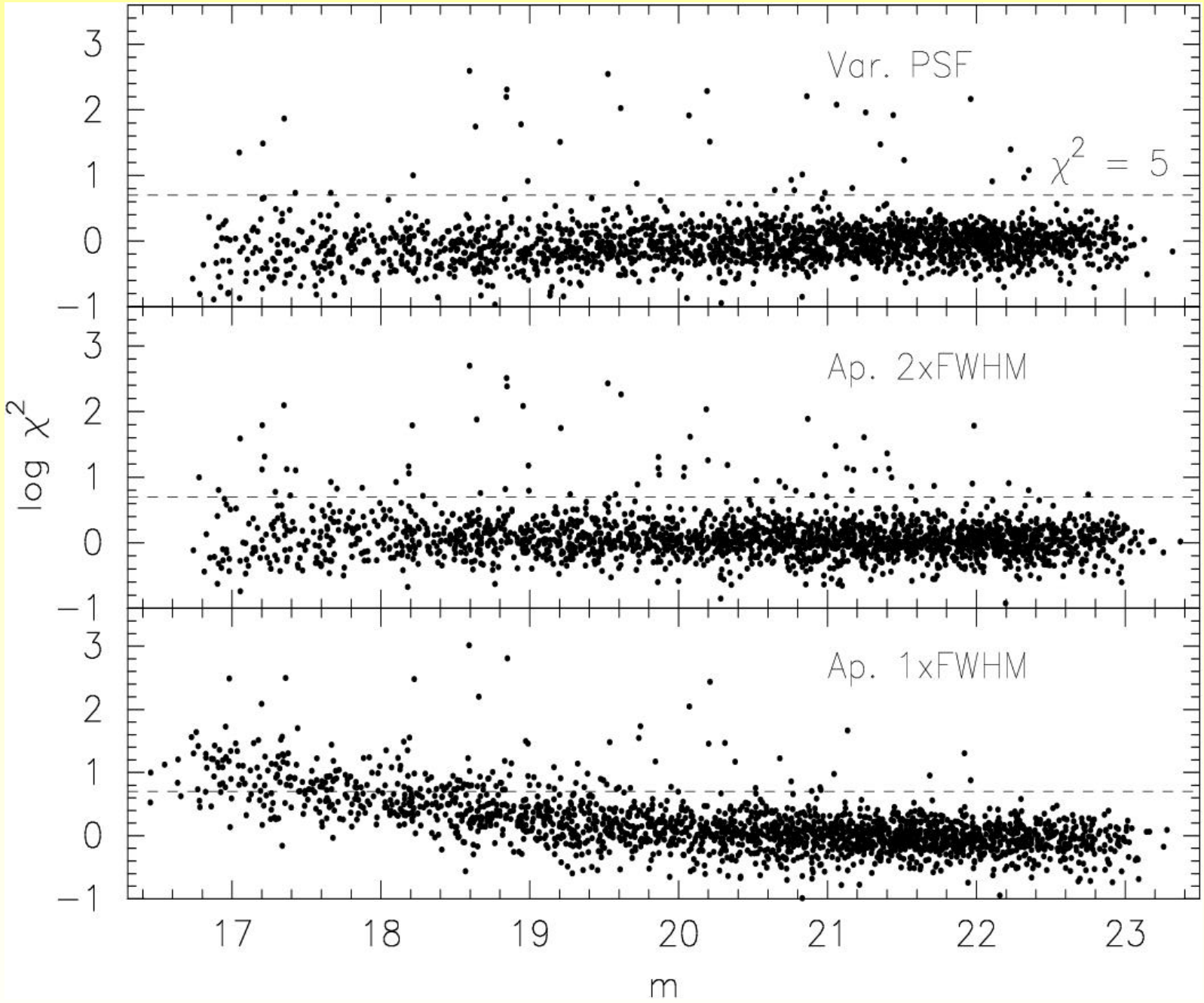
- Experience with FSVS on the WFC@INT shows that this is achievable if position-variable psf-fitting is used to obtain photometry

- To reliably achieve period-'guess' we need at least 20 points.

Photometric Variability




1
0.1
0.01
10^{-3}
σ_{m_V}
Var. PSF
1
0.1
0.01
10^{-3}
σ_{m_V}
Ap. 2xFWHM
17
18
19
20
21
22
23
24
m_V


Var. PSF
$\chi^2 = 5$
Ap. 2xFWHM
Ap. 1xFWHM
log χ^2
m
3
2
1
0
−1
17
18
19
20
21
22
23

Critical Items

- Correct differential photometry (var. psf)
- Good flat fielding to push the limit lower
- Because of 2 hrs limit: foresee less problems with variable seeing/conditions
- Observing efficiency! Overheads!!!!
- Data volume: 6 Tbyte in 2 years (16 nights)

VPHAS+

- Proposed ESO Public Survey
- Image full Southern Plane in u',g',r',i',Hα
- Down to r'=21 and equivalents.
- Area: 185x10 degrees: 1850 sq. degr.
- ΩWhite overlaps VPHAS+

VPHAS+

- Data handled through Cambridge
- Working on UV and IR equivalents.
- Critical: crowding, seeing, homogeneity