

SN session: an introduction

Ph.Gris

2020/02/04



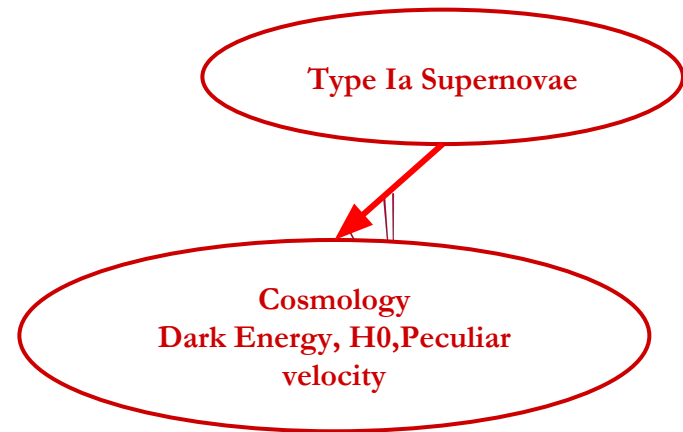
Major goal

Collect a *large* number of *well-sampled* type Ia supernovae

Type Ia Supernovae

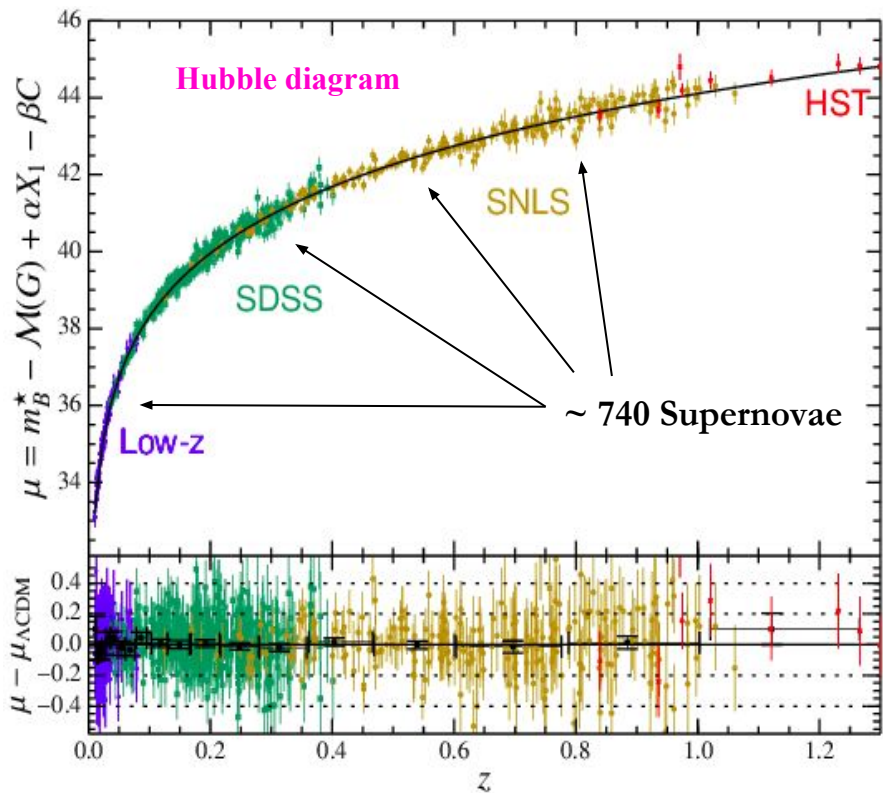


Major goal



Major goal

Distance modulus



M. Betoule et al. A&A, Vol. 568, id.A122

Cosmology (fit)

-> Dark Energy constraints

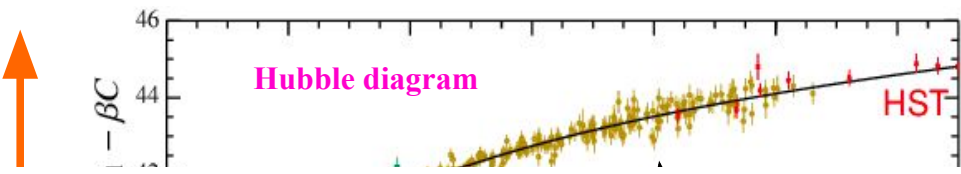
Type Ia Supernovae

Cosmology
Dark Energy, H0, Peculiar
velocity

Redshift

Major goal

Distance modulus



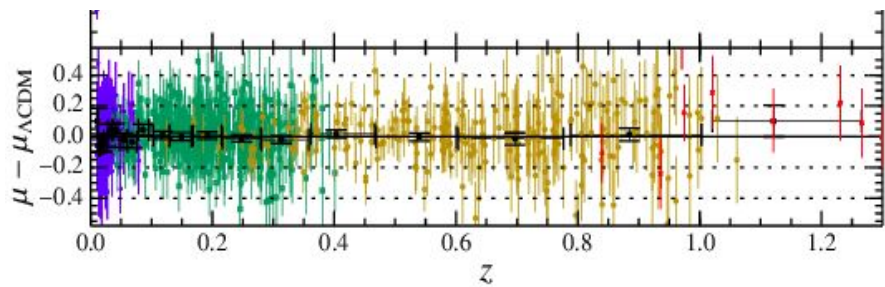
M. Betoule et al. A&A, Vol. 568, id.A122

LSST : type Ia Supernovae for Hubble diagram

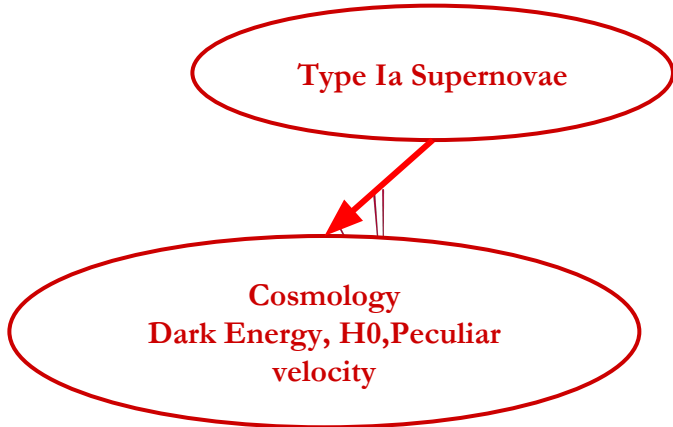
- large sample (x few 100)
- well calibrated (photometry) well measured
- with minimal bias (ie high redshift completeness)

Cosmology (fit)

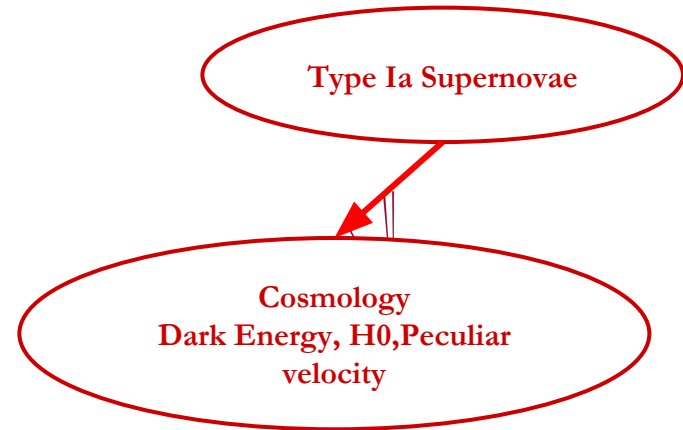
-> Dark Energy constraints



Redshift



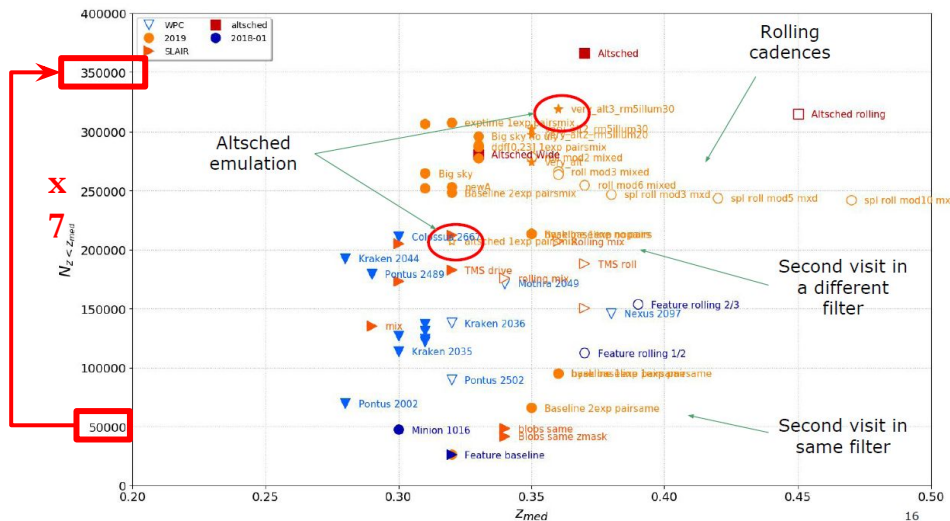
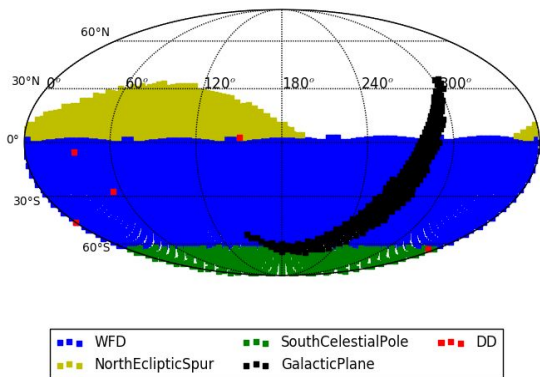
Key components to achieve this goal



Key components to achieve this goal

Observing Strategy

- cadence (2-3 days)
- depth (z limit)
- season length (>6months)
- multi-band obs. (filter allocation)



N. Regnault (OSWG)

7

Type Ia Supernovae

Cosmology
Dark Energy, H0, Peculiar
velocity

7

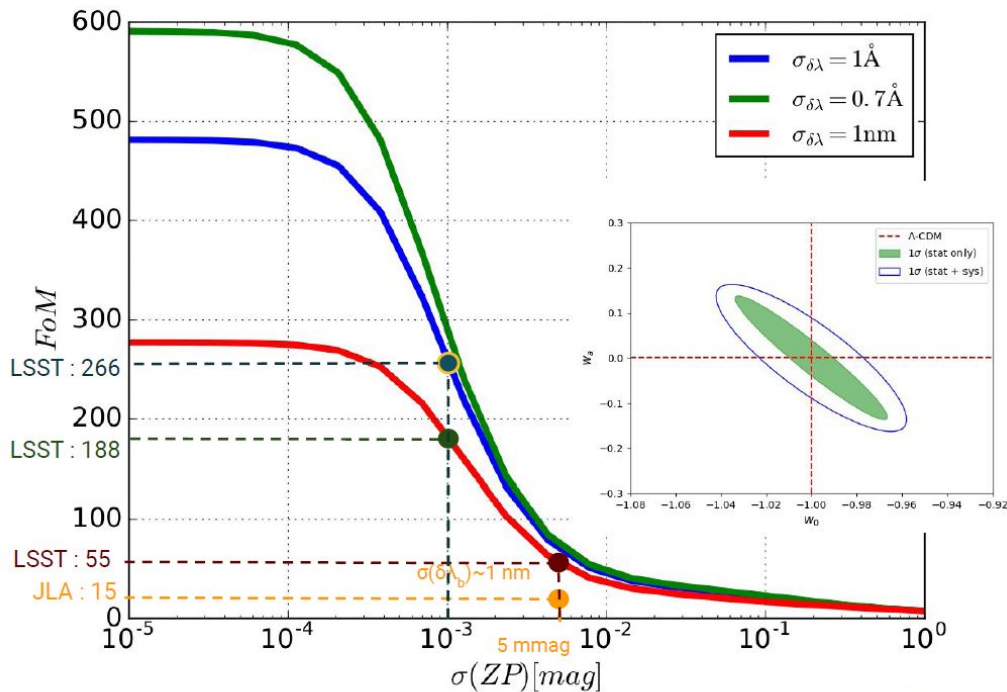
Key components to achieve this goal

Observing Strategy

Calibration (flux)

- astrometry
- photometry
- PSF
- filter metrology
- ...

Calibration requirements for LSST



Type Ia Supernovae

Cosmology
Dark Energy, H_0 , Peculiar
velocity

Key components to achieve this goal

Observing Strategy

Calibration (flux)

Light curve
extractiion

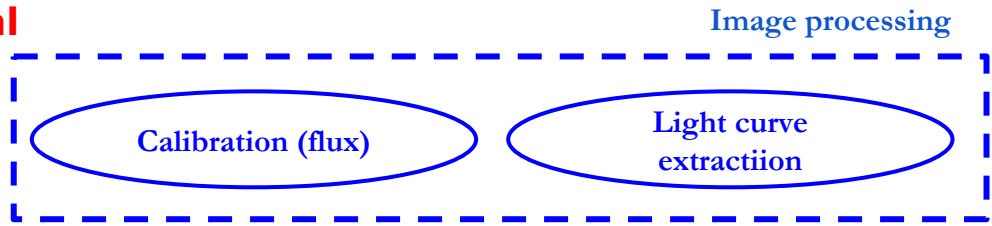
- image subtraction
- scene modeling
- ...

Type Ia Supernovae

Cosmology
Dark Energy, H0, Peculiar
velocity

Key components to achieve this goal

Observing Strategy



Type Ia Supernovae

Cosmology
Dark Energy, H0, Peculiar
velocity

Key components to achieve this goal

Image processing

Observing Strategy

Calibration (flux)

Light curve
extractiion

High quality light-curves

Type Ia Supernovae

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Dark Energy, H0, Peculiar
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Key components to achieve this goal

Image processing

Observing Strategy

Calibration (flux)

Light curve extraction

SN parameters

High quality light-curves

- SED Modeling
- SALT2, SUGAR, SNEMO
- ..

Identification

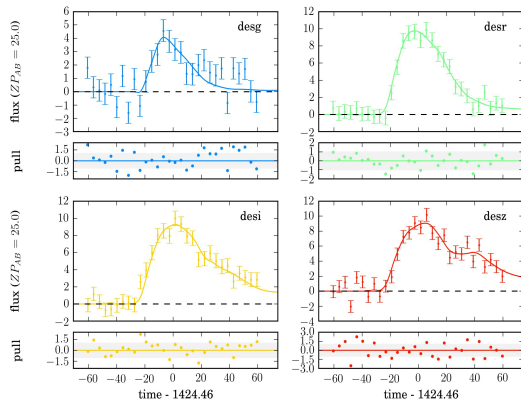
Type Ia Supernovae

Cosmology
Dark Energy, H0, Peculiar
velocity

- photometric classification (phot-z)
- Host properties
- ...

$$z = 0.48753647$$
$$t_0 = 1424.46 \pm 0.40$$
$$x_0 = (1.034 \pm 0.033) \times 10^{-5}$$

$$x_1 = 2.37 \pm 0.39$$
$$c = 0.066 \pm 0.023$$



Key components to achieve this goal

Image processing

Observing Strategy

Calibration (flux)

Light curve extraction

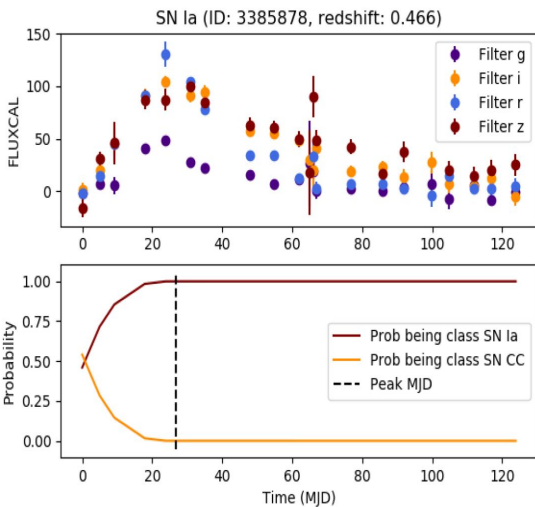
High quality light-curves

SN parameters

Identification

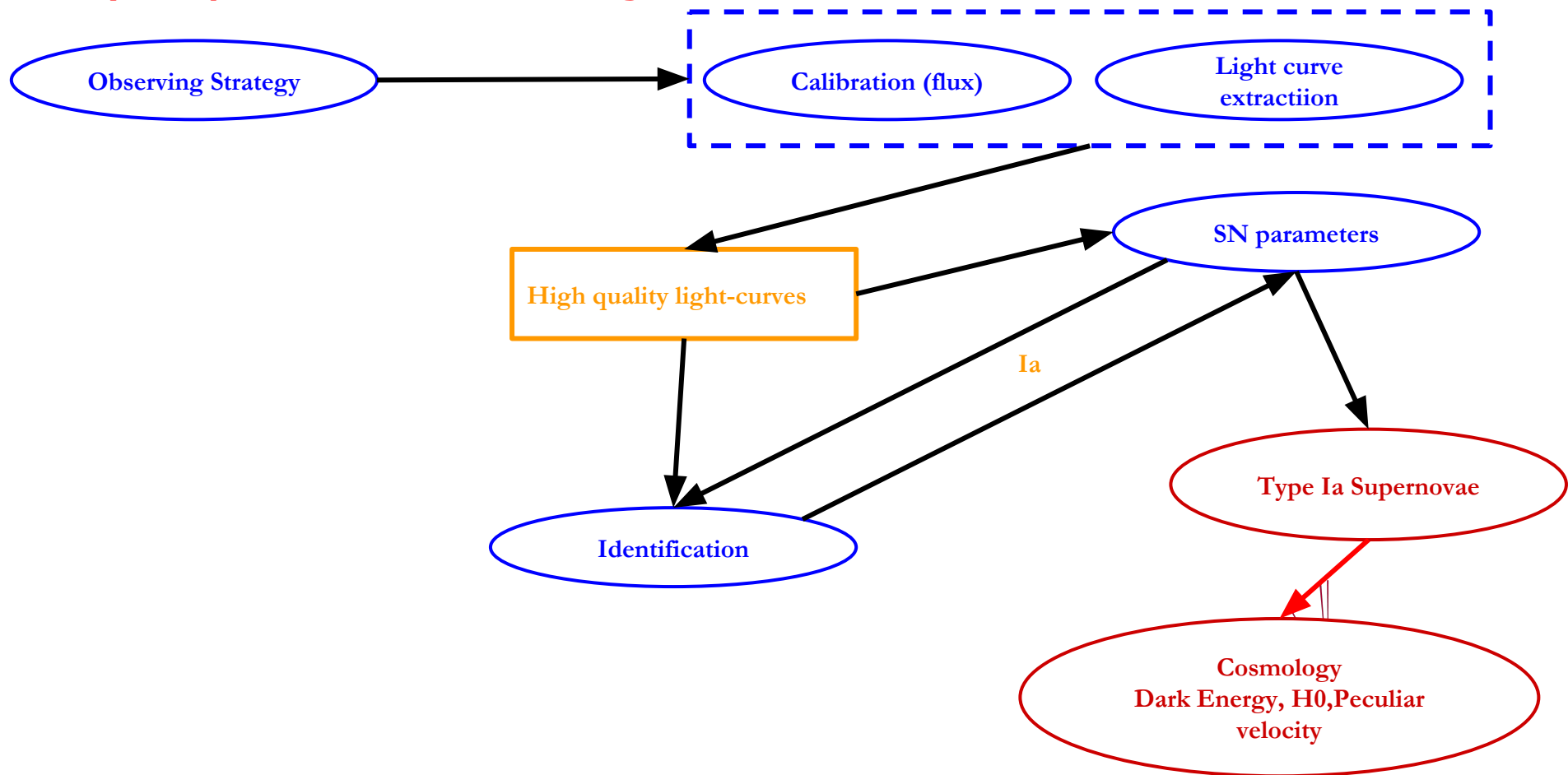
Type Ia Supernovae

Cosmology
Dark Energy, H₀, Peculiar velocity



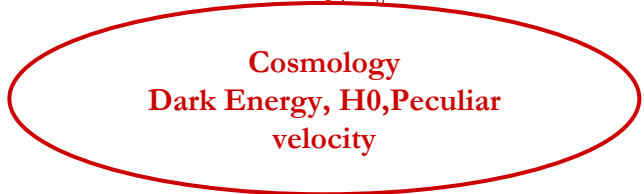
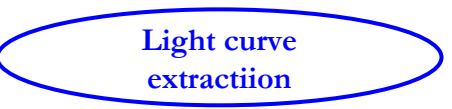
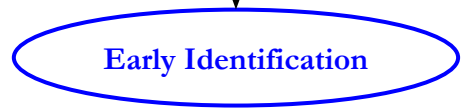
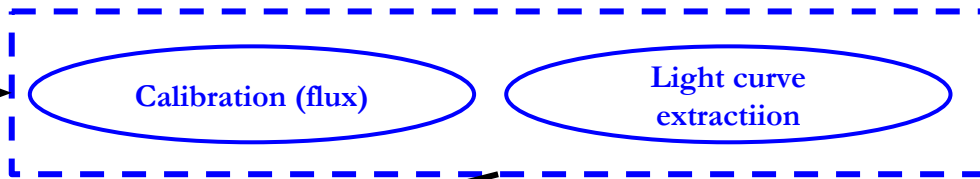
Key components to achieve this goal

Image processing



Key components to achieve this goal

Image processing

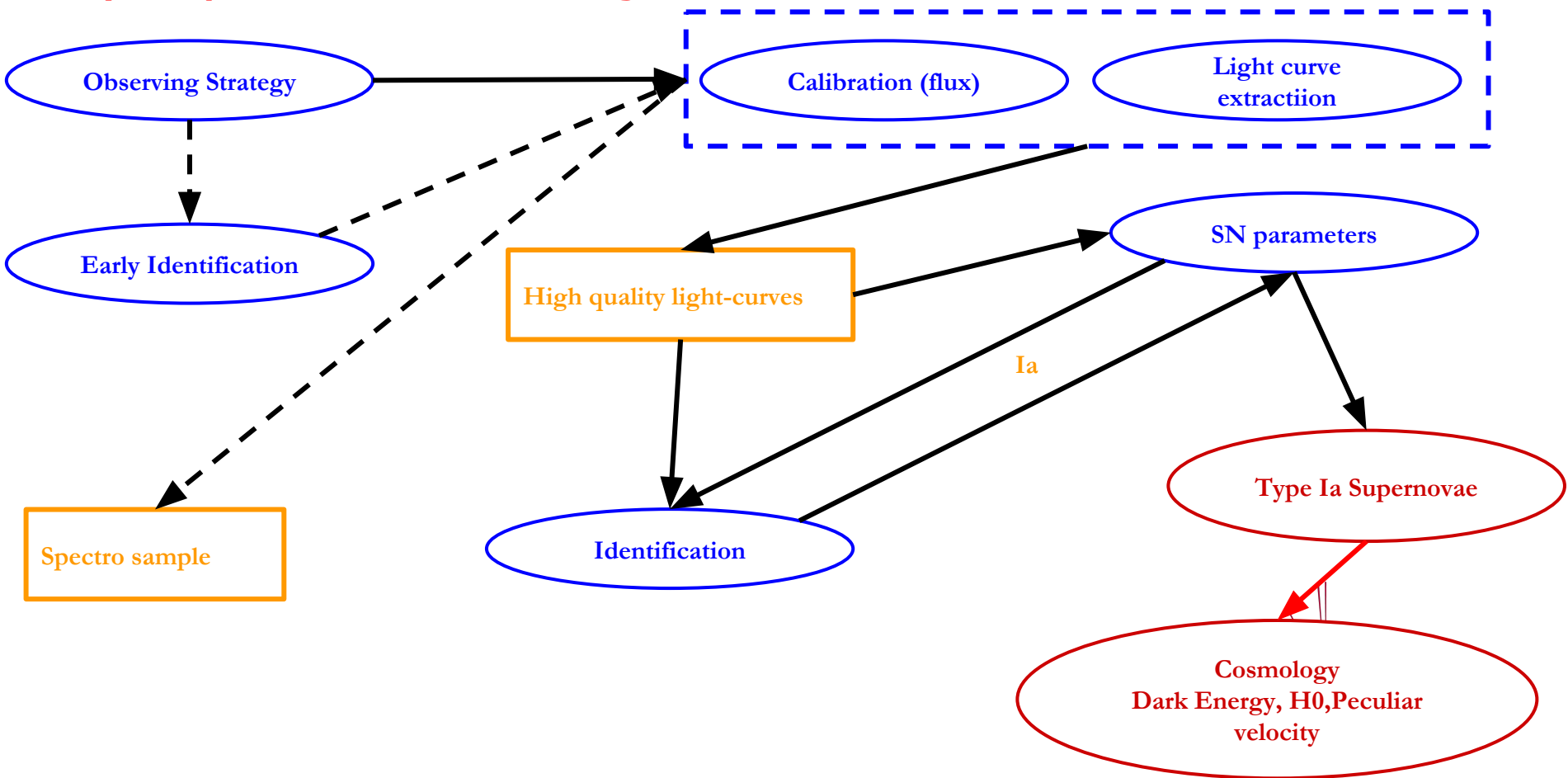


- broker
- Spectroscopic follow-up
- ...

Ia

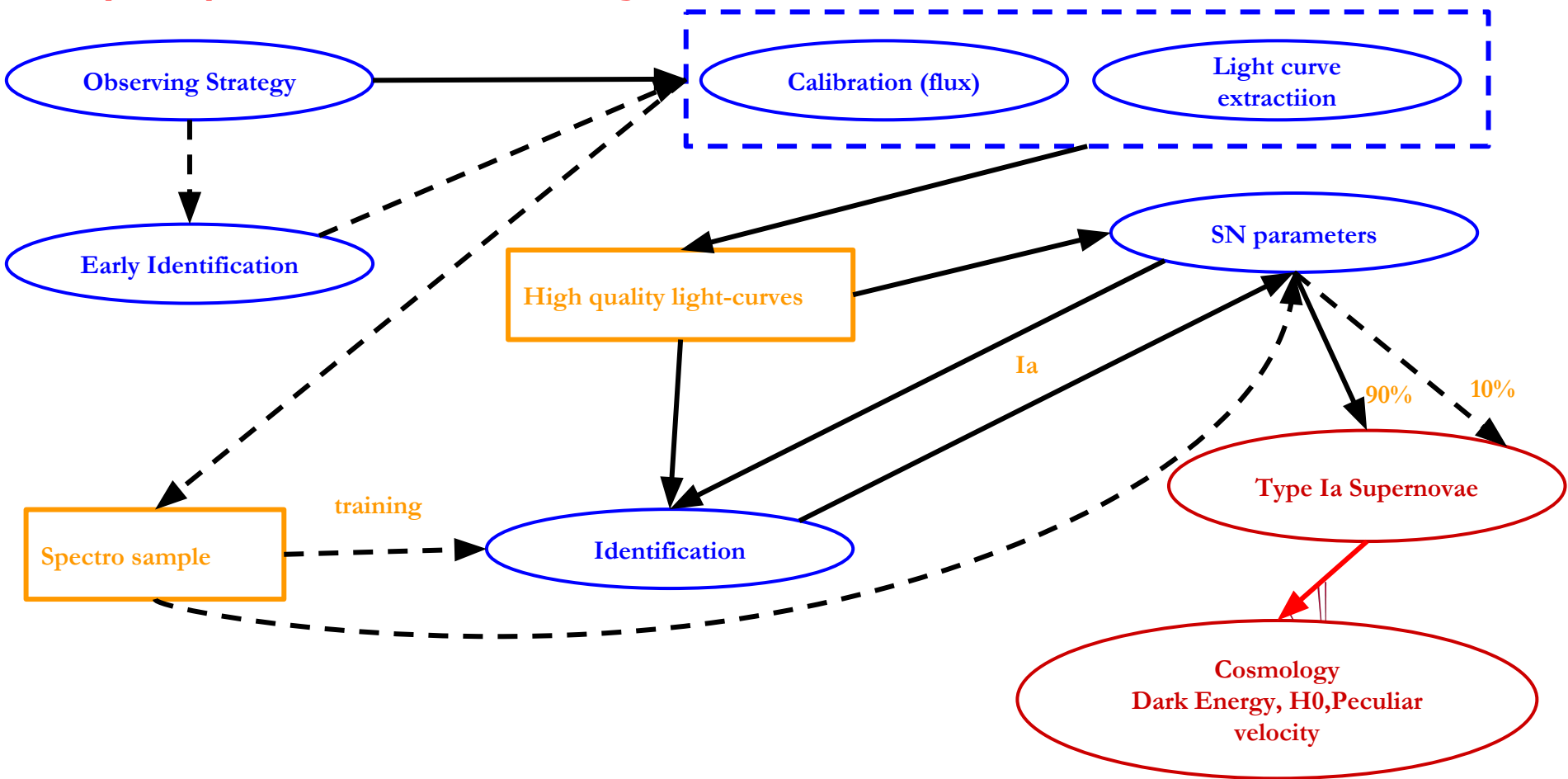
Key components to achieve this goal

Image processing



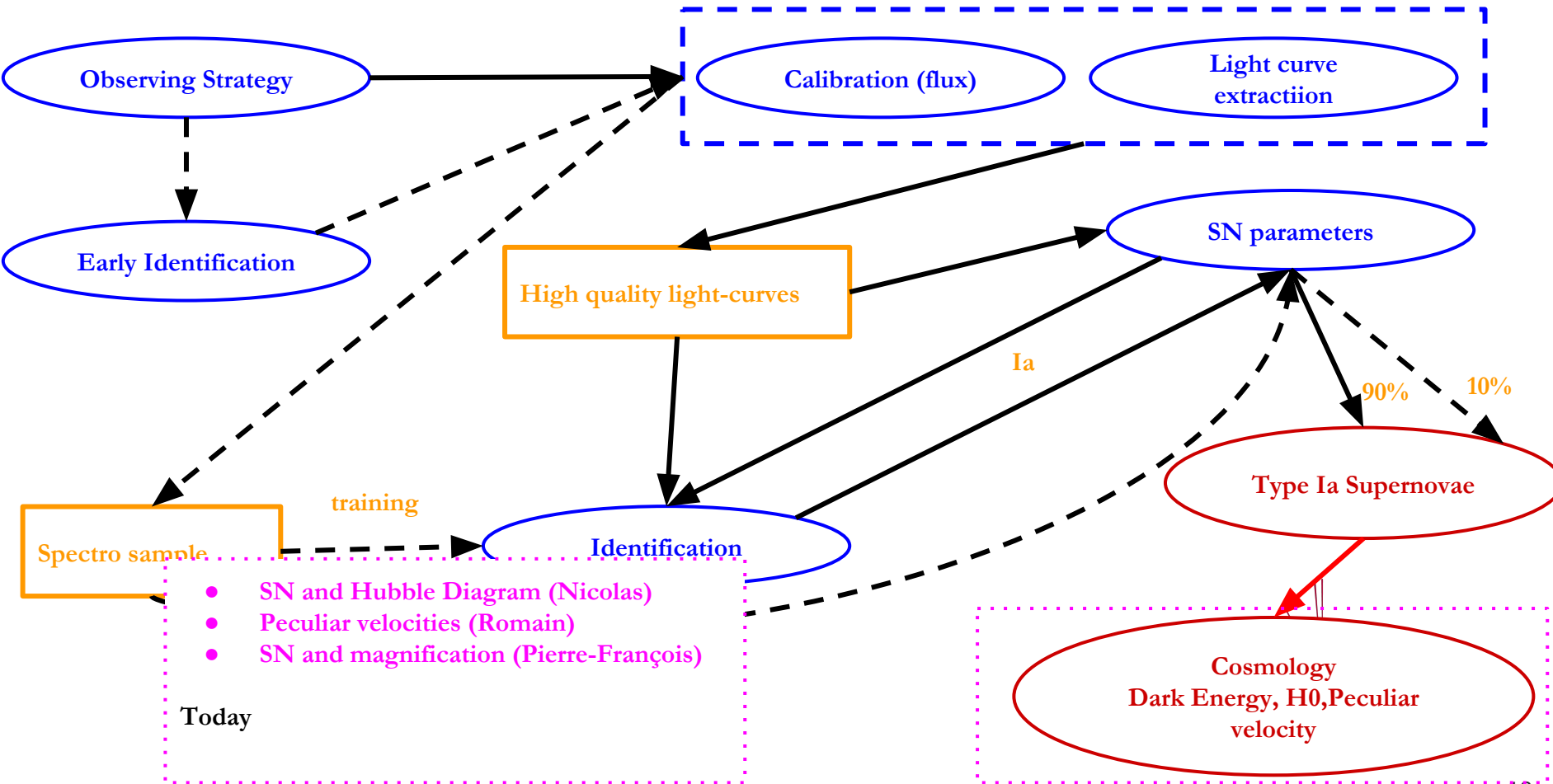
Key components to achieve this goal

Image processing



Key components to achieve this goal

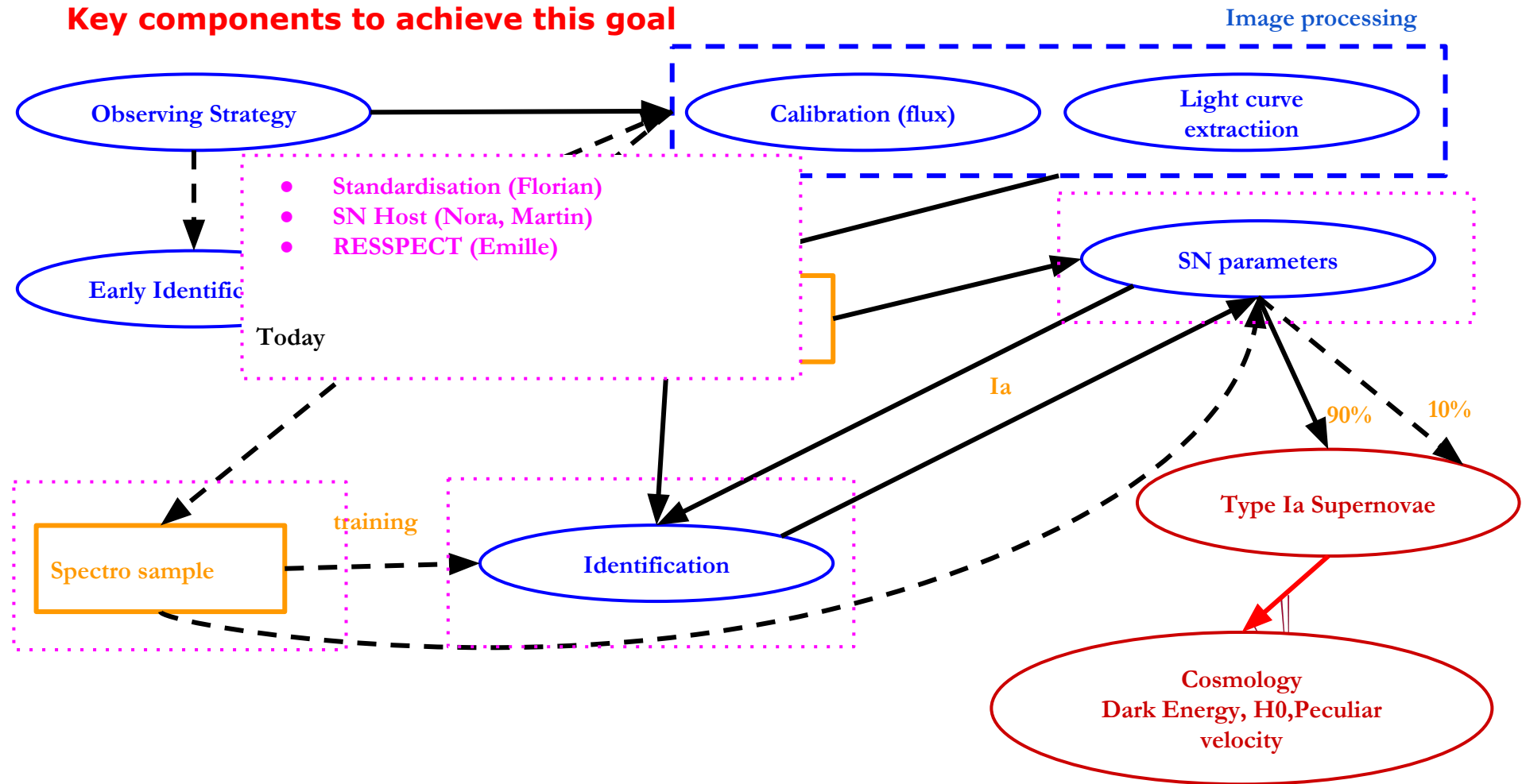
Image processing



- SN and Hubble Diagram (Nicolas)
- Peculiar velocities (Romain)
- SN and magnification (Pierre-François)

Today

Key components to achieve this goal



Key components to achieve this goal

Image processing

