Science cases → design

| TLR	Reference science cases	HIRES Consortium	ESO-204697 (Table 15)
Spectral resolution	most cases stellar structure IGM tomog., gal. evolution	~ 100,000 100,000 (goal 150,000) >=10,000	50,000-100,000 150,000 (goal 200,000) >10,000
Wavelength range	most cases	0.37-2.5 μm (goal as blue as practical)	0.37-2.4 μm (goal 0.33-2.4μm)
Spatial resolution	most cases solar system, protopl. disks, stellar structure, superm. black holes	point sources, no spatial information needed nearly DL in K (goal NIR)	point sources, no spatial information needed DL on-axis at λ>1μm
Entrance aperture	most cases exoplanet atmospheres solar system, protopl. disks, stellar structure, superm. black holes dense stellar field stellar populations, galaxy evolution, IGM tomography	1 (single object) 1 (goal 2) DL IFU in K (goal NIR), a few tens mas FoV DL IFU/MOS in K (goal NIR), a few 10 (goal a few 100) mas FoV	1 (single object) 2 (target and reference) DL IFU at NIR, 20-200 mas FoV 10
Wavelength calibration	most cases precise RVs	< 1 m/s Espresso-like in the visual	< 0.7 m/s (goal <0.5 m/s)
Stability on detector	exoplanet atmospheres	10 cm/s night^{-1} PSF+detector <0.1%	10 cm/s night^{-1}
Stability of λ calibration	redshift drift	2 cm/s (goal 1cm/s)	2 cm/s (goal 1cm/s)
Sky subtraction	galaxy evolution, reionization, IGM	simultaneous sky and target spectra in single object mode, only a goal in IFU mode	simultaneous sky and target spectra in single object mode, only a goal in IFU mode
Polarimetry	exoplanet atmospheres, protoplanetary disks, stellar magnetic fields	full Stokes vector, single point-sources, simultaneous feed for two spectrographs	Accuracy 10^{-3} Sensitivity 10^{-5}
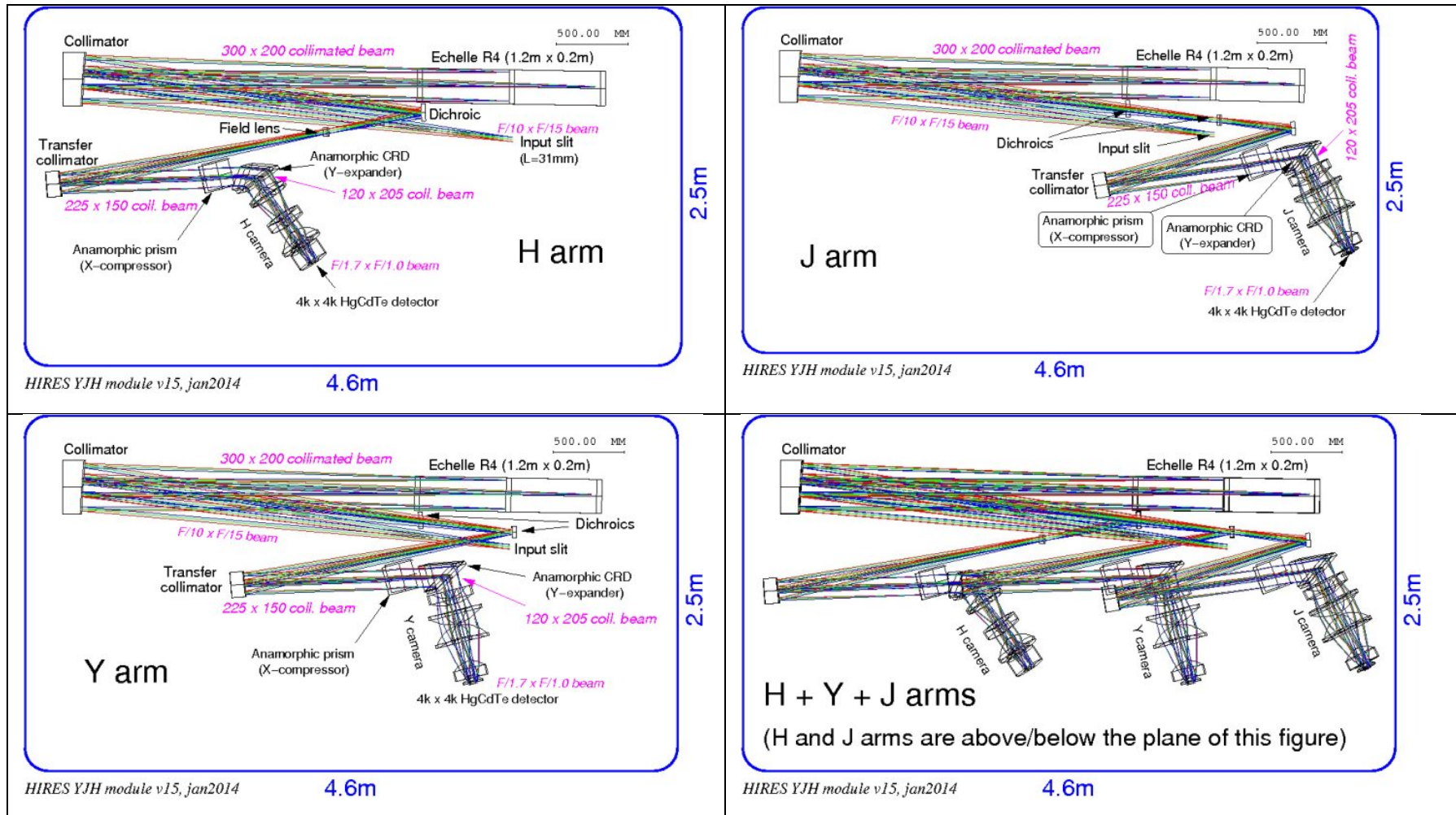
Figure 8: Preliminary Optical Layout of the YJH arm of HIRES

Key facts (lesson 1)

- Esigenza scientifica (White book) , specifiche tecniche (esigenza operativa)

  - **IDEA !!**

- vincoli: tempi, manpower, dimensioni, massa, materiali, detector, costo

- **progetto ottico (foglio, Zemax, simulazioni)**

- **Progetto meccanico (FEA, CAD 3D)**

- **Realizzazione parti (project management, system engineering, outsourcing)**

- **Montaggio parti**

- **collaudo (acceptance test) e prima luce**

- **Science verification (prime pubblicazioni)**