

Section 4 - Exercise #5

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- 5 Suppose you wish to search the entire sky for relatively faint, point-like objects called quasars whose spectra show strong emission lines at high redshifts. What technique would you use?

Key point :

- Entire sky
- Faint
- Point-like objects
- Strong emission lines
- High redshift

-> 4.2.4 multiobject spectroscopic survey: 3D maps of the Universe (p176)

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Method 1: Slit-less spectroscopy

- Slit-less spectroscopy: good for observe the spectra of many objects at the same time
- Condition:
 1. Sky background is vert dark
 2. Field not too dense to avoid overlapping spectra
- Why use slit-less spectroscopy?
 - more light can be collected from the target
 - allows for the observation of a wide field of view

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Method 2: multi-object spectrograph

- Reason: it can employ an entrance slit composed of multiple sub-sections which can be positioned by computer to pick up many different objects in the field of view.
- Need slit mask
- Exchange slit-masks:
 - Vacuum-cryogenic airlock system
 - Moveable opposing slit bars
 - Micro-shutters: outgrowth of the general area of micro-electro-mechanical systems (MEMS) technology
 - MEMS: integration of mechanical elements, sensors, actuators, electronics on a common silicon substrate.
- Micromachining method: selectively etch away parts of the silicon wafer, or add new structural layers
- Deformable mirrors (DMs): for wavefront control in adaptive optics system
- Fiber optic coupled systems: it collect light from multiple points (e.g., multiple stars or galaxies) and direct it to a single instrument