

WEAVE-Tumble-Less

enabling multi-field observations at low surface densities

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Image: Sarah Hughes

WHT Enhanced Area Velocity Explorer

- **Multi Object Spectrograph (MOS):**
 - FOV: $\pi \text{ deg}^2$
 - coverage: **3660-9590 Å**
 - **2 field plates** for optical fibres
 - 8 guide fibres per field

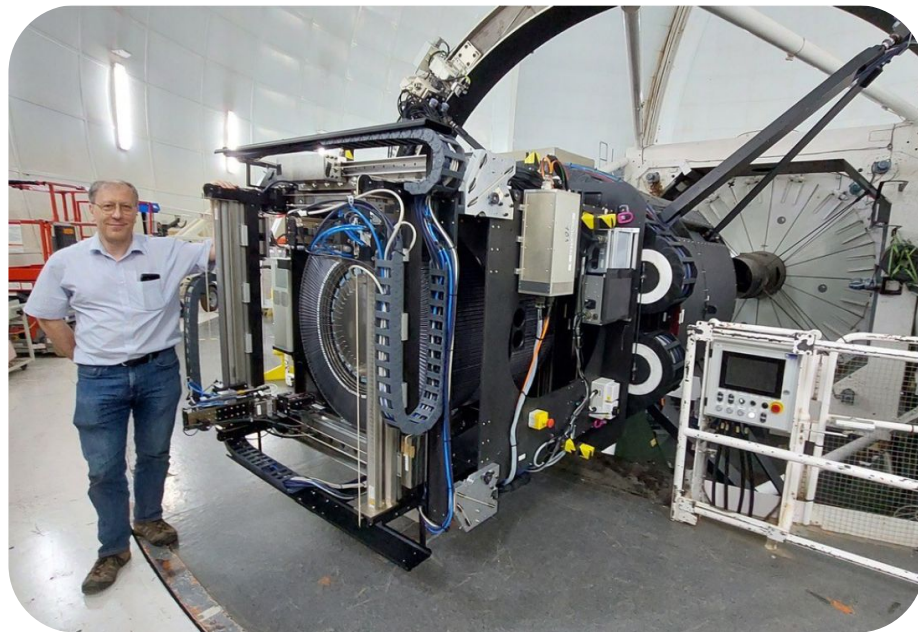
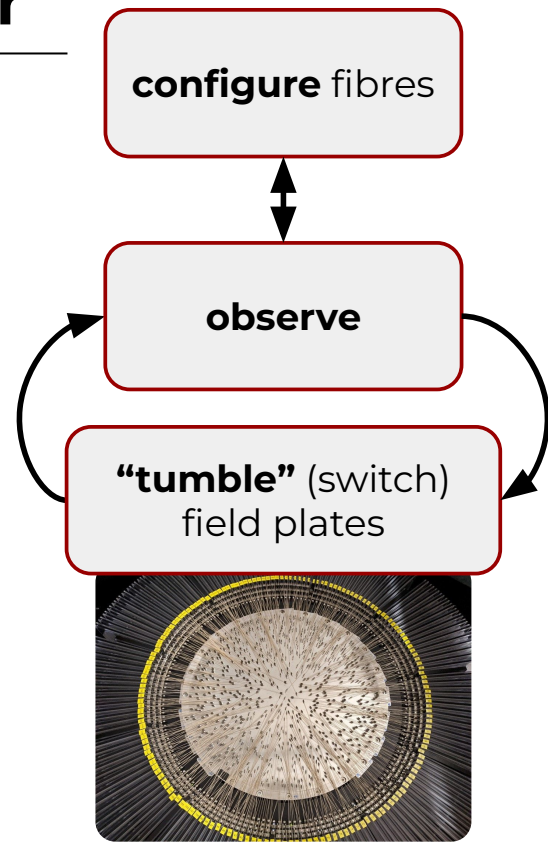


Image: Gavin Dalton

WHT Enhanced Area Velocity Explorer

- **Observing block (OB) timescales**

- fibre configure time ~ 1 h
- calibration exposures ~ 10-20 min
- read out ~ 3 min / exposure
- tumbling field plates ~ 2 min

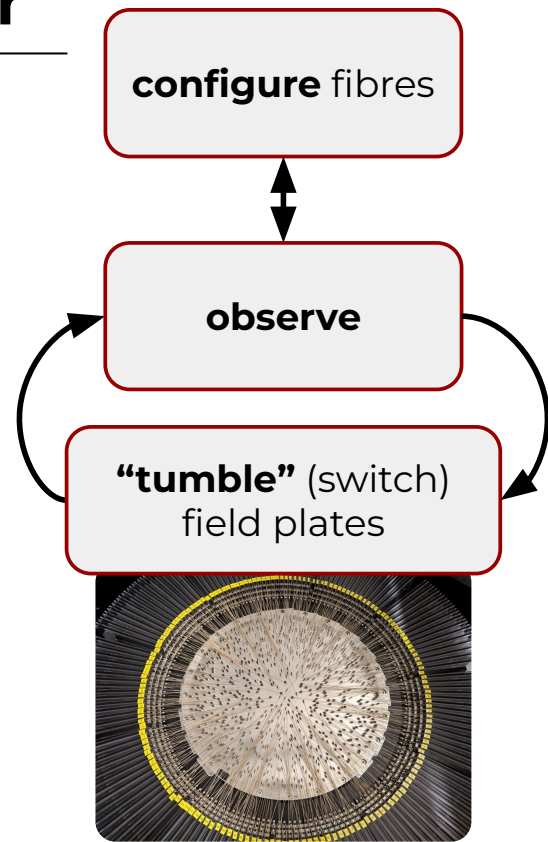


WHT Enhanced Area Velocity Explorer

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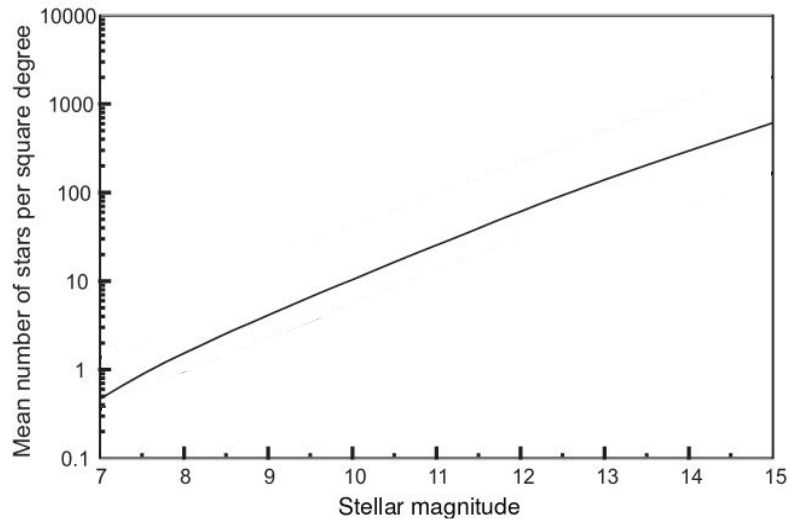
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more targets = better!



Sparse fields in MOS Surveys

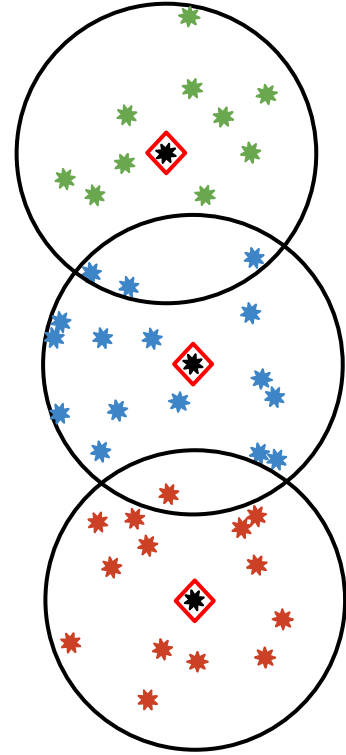
- **Bright stars**
 - less targets per area
 - important for exoplanet science, asteroseismology, ...
- **Open-time surveys**
 - relatively low number of targets
 - scattered over the sky



Adapted from Zakharov+, 2013

WEAVE-TL: Field Superposition

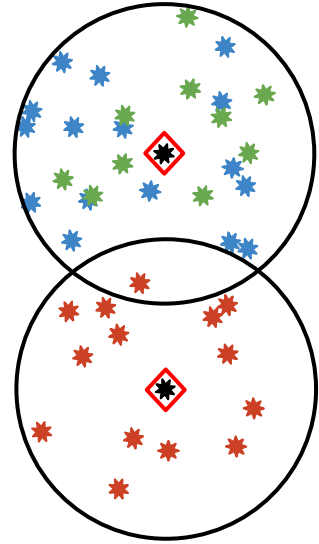
- **Merging the fields**
 - central guide star as reference point
 - transform coordinates into field plate reference frame
 - works for up to 3 fields



WEAVE-TL: Field Superposition

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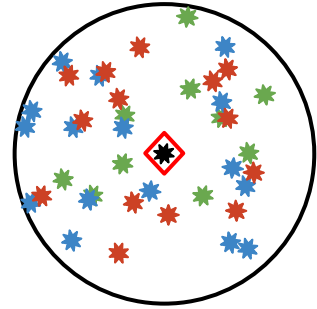
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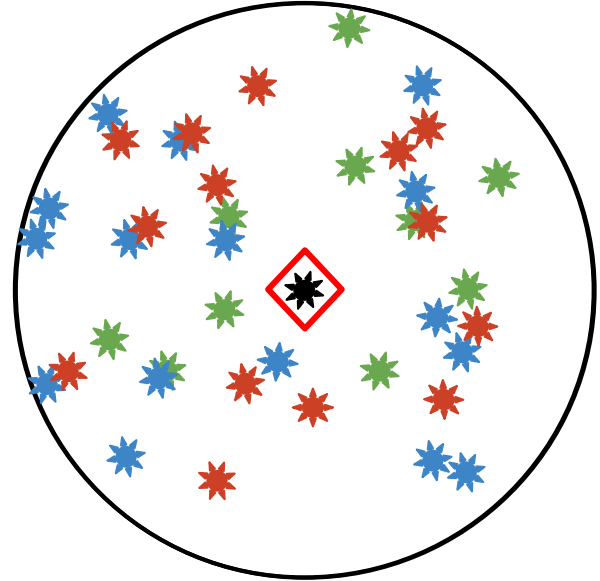
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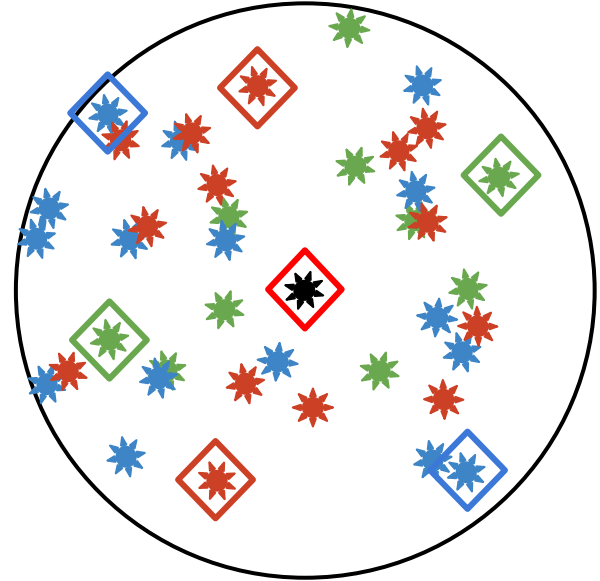
WEAVE-TL: Guide Fibre Allocation

- **Target acquisition & guiding:**
 - each field needs:
 - 1 centre & 2 off-centre guide stars
 - only central guide fibre can be shared



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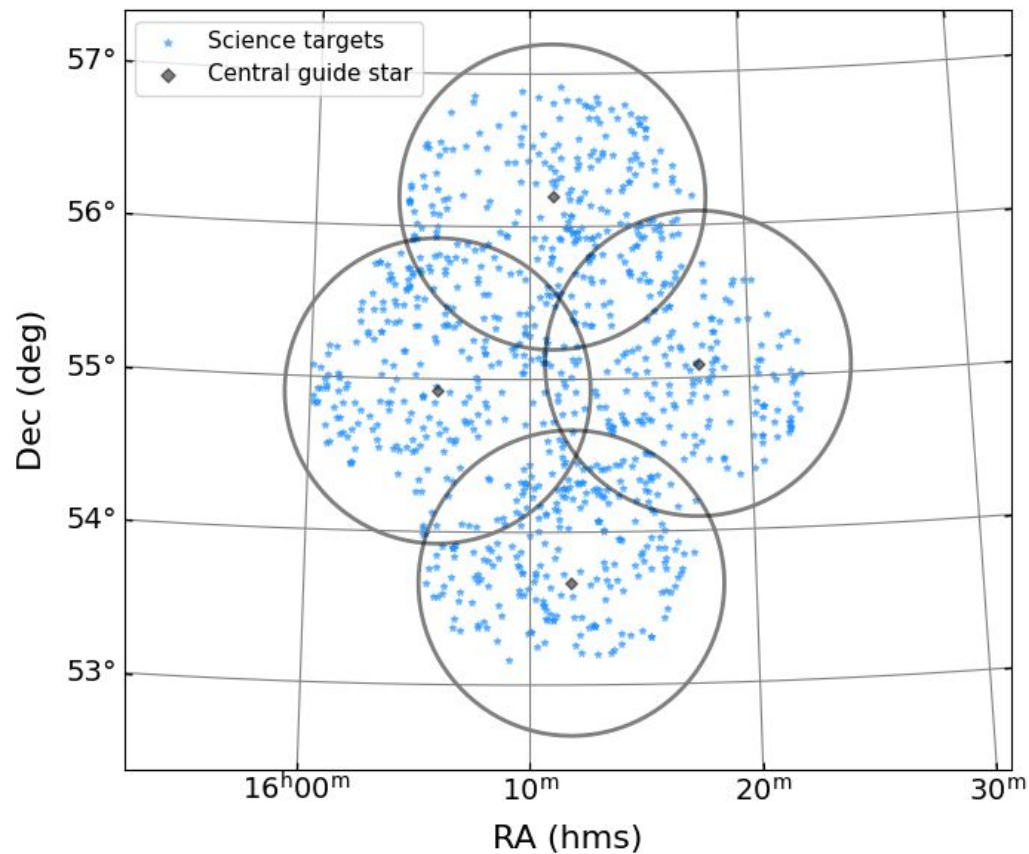
- **Target acquisition & guiding:**
 - each field needs:
 - 1 centre & 2 off-centre guide stars
 - only central guide fibre can be shared
- **Observations**
 - up to 3 pointings using same fibre configuration
 - works up to $\sim 10 - 15$ deg separation



➡ **no field plate change (tumbling) necessary!**

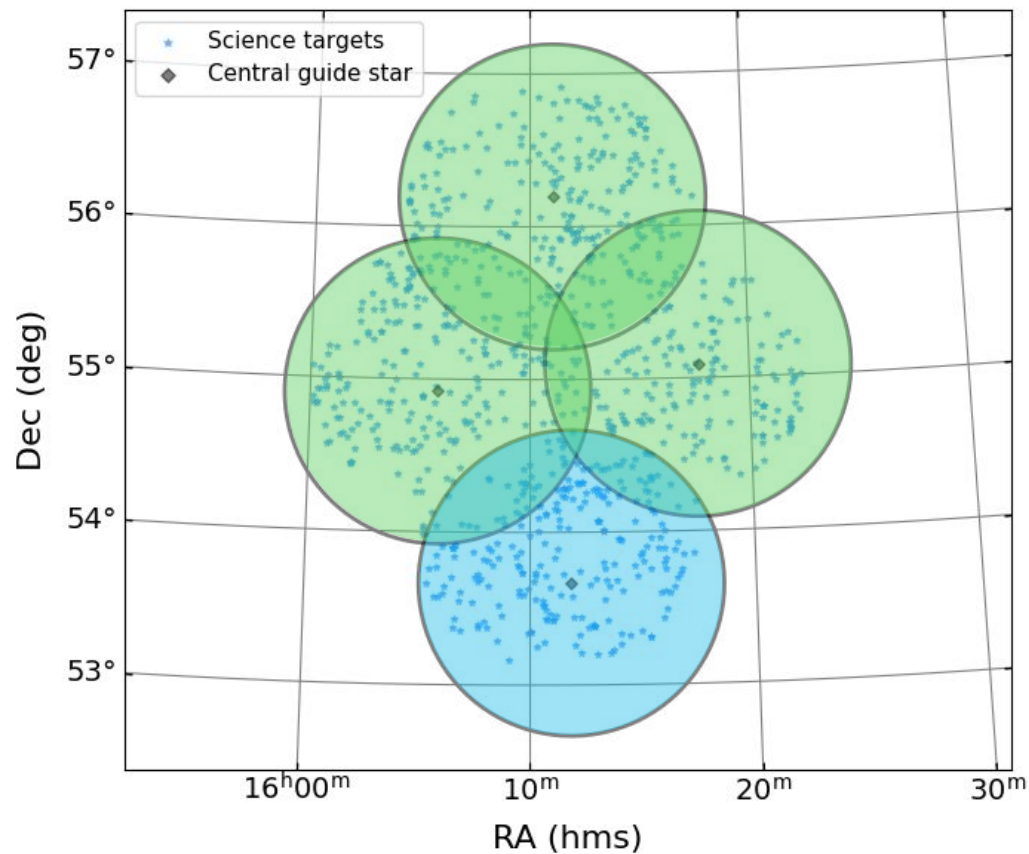
Potential usecases

- **Small open-time fields**
 - ~ 100 targets per field
 - 4 OBs in regular mode



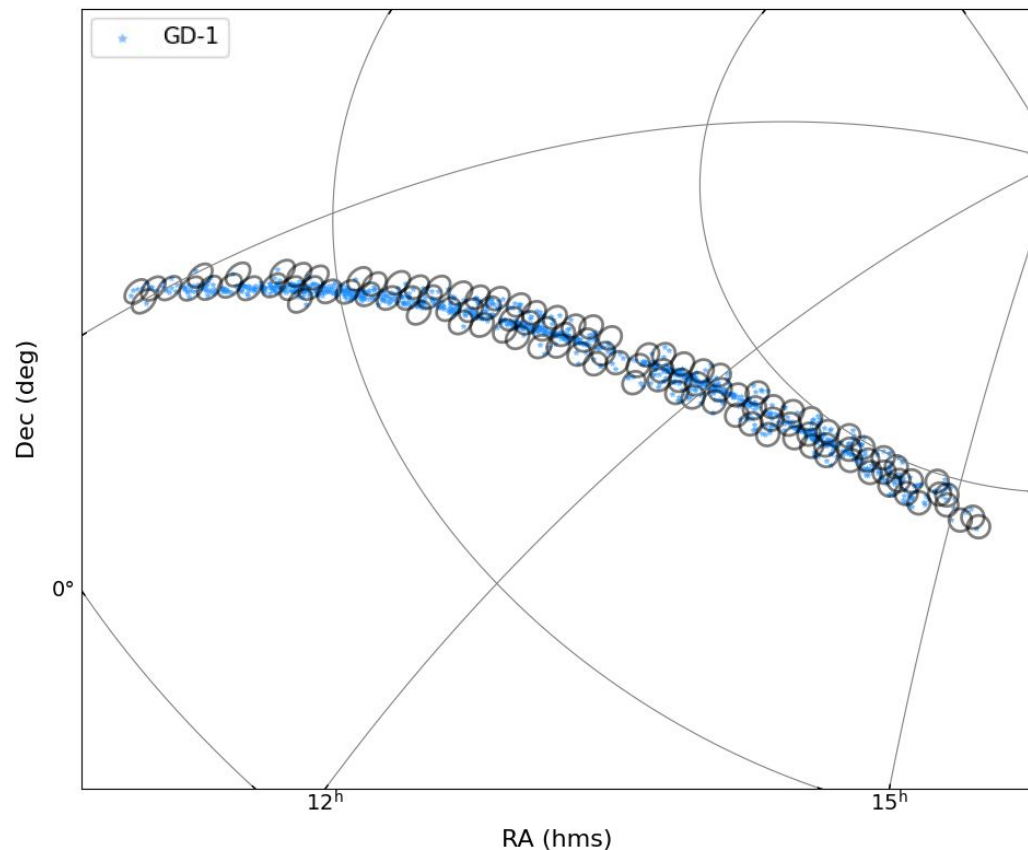
Potential usecases

- **Small open-time fields**
 - ~ 100 targets per field
 - 4 OBs in regular mode
 - **2** using WEAVE-TL



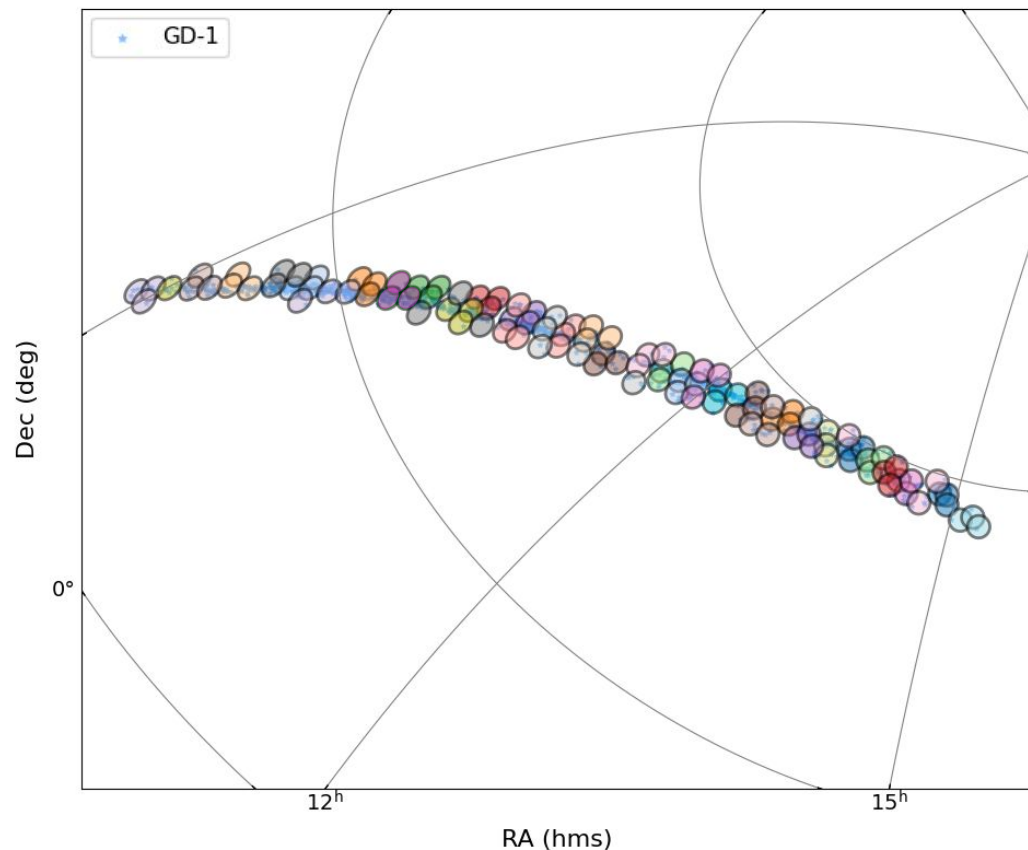
Potential usecases

- **Small open-time fields**
 - ~ 100 targets per field
 - 4 OBs in regular mode
 - 2 using WEAVE-TL
- **Stellar streams**
 - GD-1 covered with 109 fields
 - 109 OBs in regular mode



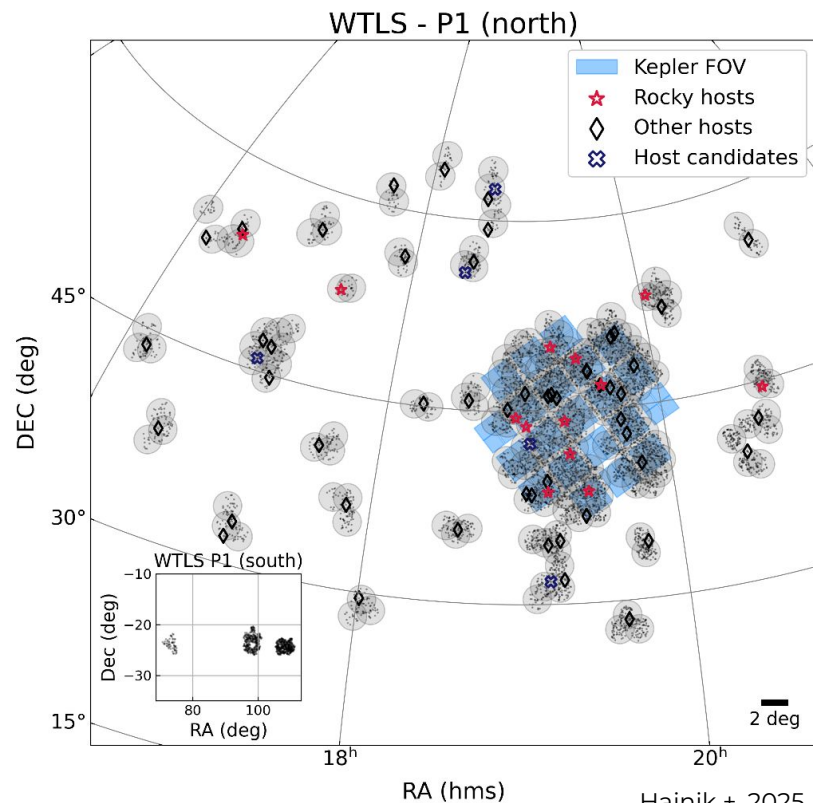
Potential usecases

- **Small open-time fields**
 - ~100 targets per field
 - 4 OBs in regular mode
 - **2** using WEAVE-TL
- **Stellar streams**
 - GD-1 covered with 109 fields
 - 109 OBs in regular mode
 - **37** using WEAVE-TL



The WEAVE-TwiLight-Survey

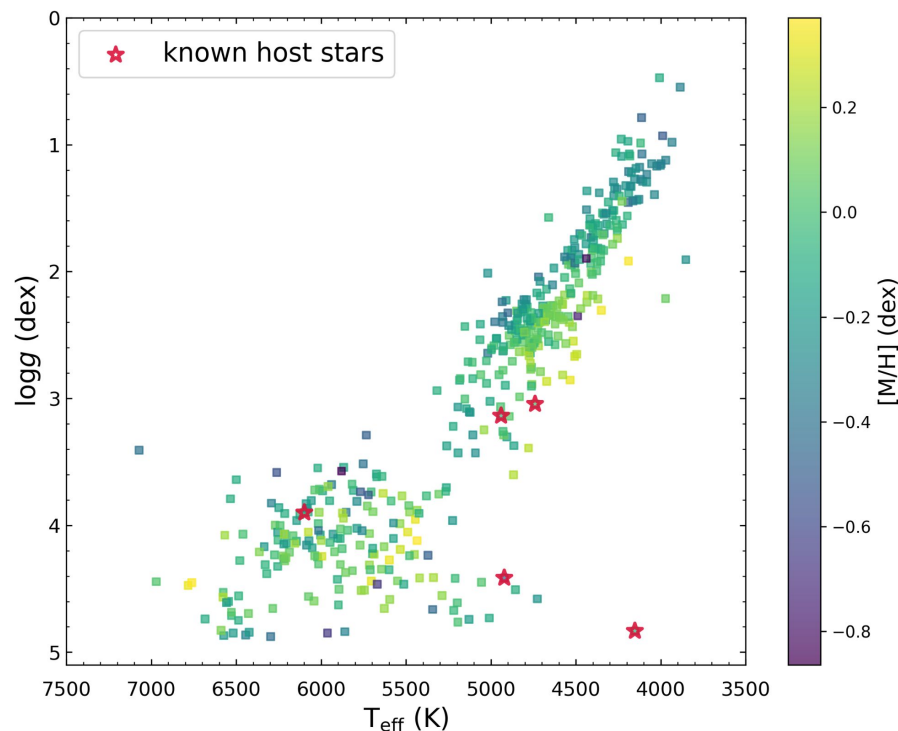
- **Pilot for WEAVE-Tumble-Less mode**
 - low field surface density observations
without sacrificing efficiency
 - magnitude cut sample $6 \leq V \leq 12.1$ mag
 - focused on exoplanet hosts and their on-sky surroundings
- **Aims**
 - testing the new mode
 - characterise $\sim 9\,000$ bright stars
 - RVs, stell. params & chem. abundances



The WEAVE-TwiLight-Survey - first results

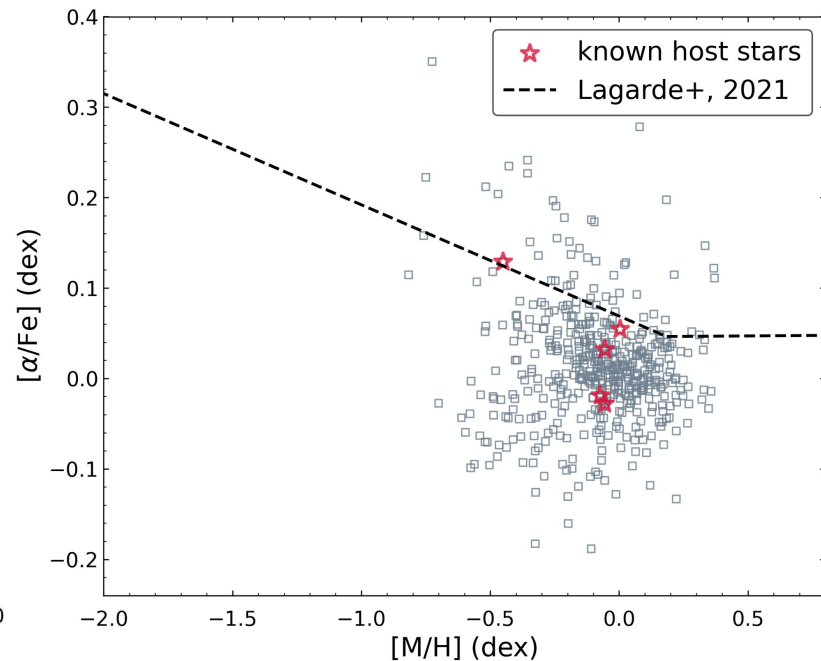
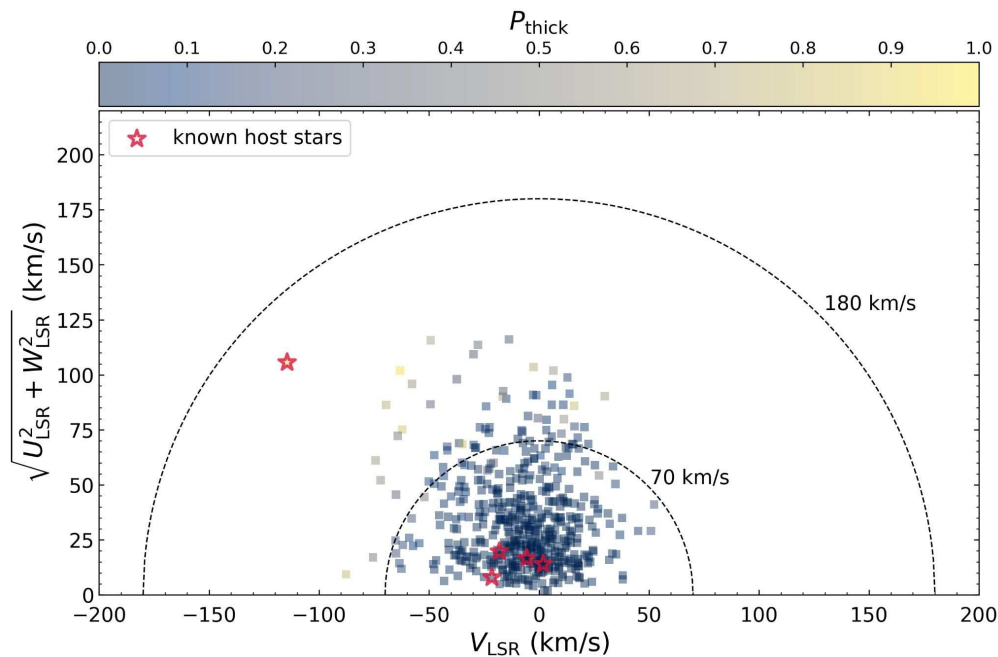
- **Preliminary data**

- ~ **700** targets observed
- processed with WEAVE's
CPS and **APS pipelines** (dev version)
- showing stars with
 $3\,500 < T_{\text{eff}} < 7\,500\text{ K}$ (test runs)



Hajnik +, in prep.

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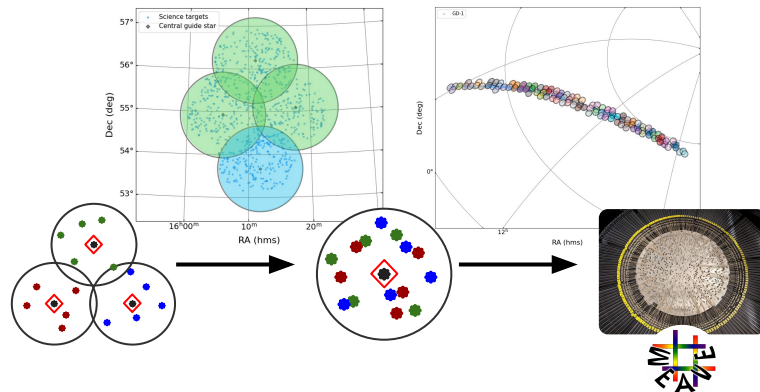


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Summary

- **Efficient observations of sparse fields**

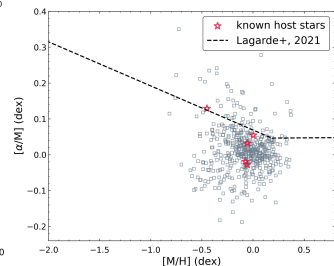
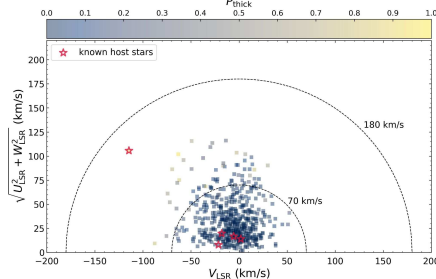
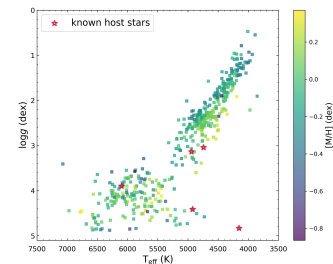
- combine multiple fields
- reduces observational overheads
- up to 3 fields with one fibre configuration



- **WEAVE-TwiLight-Survey**

- sourced from PLATO LOP and TESS-cvz
- ~ **116** host stars + surrounding
- ~ **9 000** individual spectra with abundances
- ~ **700** targets observed more coming!

Paper!



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