

Near InfraRed Tunable Filter (NIRTF) for a 2nd Generation Instrument of DKIST

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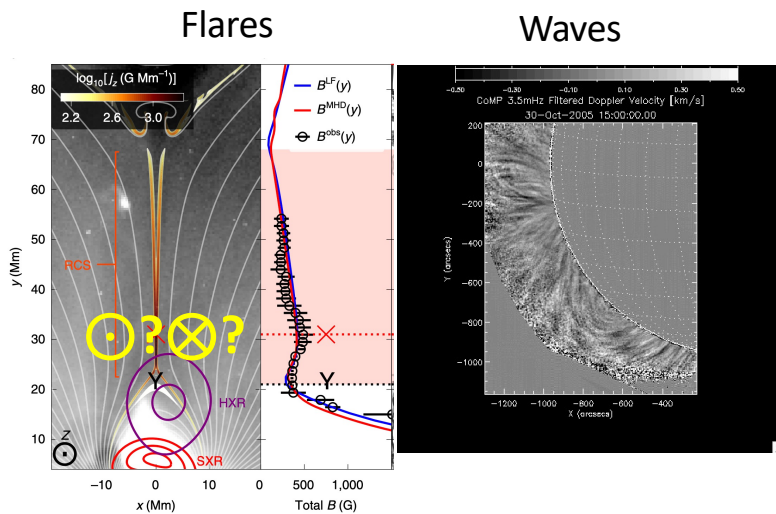
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Describe the highest priority science goals to be address:

Understand dynamic solar phenomena taking place on the scale of active regions

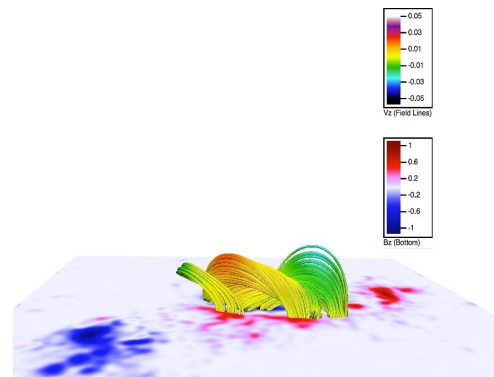
1. Measurements of \vec{B} in the corona relating to plasma dynamics
2. Measurement of \vec{B} in chromosphere to investigate flare triggers
3. Measurement of \vec{B} in prominences to study MHD turbulence

- 2-1. Extrapolation of the coronal \vec{B} => Study MHD instabilities
- 2-2. Identify flare trigger phenomena

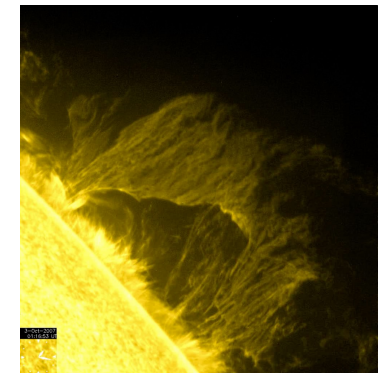


Chen et al. 2020

Tomczyk et al. 2007



Inoue et al. 2018



NAOJ/JAXA

4. Measurement of \vec{B} & E in prominences or jets to study magnetic diffusion

Develop a comprehensive ranked research strategy that provides an ambitious but realistic approach to address these goals that includes ground- and space-based investigations as well as data and computing infrastructure to support the research strategy

Develop a large-aperture near infrared tunable narrow-band filter for a DKIST 2nd generation instrument

Item	Performance
Spectral coverage	1 μm to 1.6 μm <ul style="list-style-type: none"> • Fe I 1.564 μm (Photosphere V and B [Zeeman]) • He I 1.083 μm (Chromosphere V and B [Zeeman+Hanle]) • H I 1.020 μm (P7) /1.094 μm (P6) (Chromosphere V, B, and E [Zeeman+Stark]) • Fe XIII 1.074 μm (Corona V and B [Zeeman+Hanle])
Spectral resolution	$\lambda/\Delta\lambda_{\text{FWHM}} > 50,000$ for the photosphere and the chromosphere $\lambda/\Delta\lambda_{\text{FWHM}} > 8,000$ for the corona
Spectral scan	Cover spectral line widths <ul style="list-style-type: none"> • >0.3 nm needed for Fe XIII
Spatial resolution & Field-of-view	For the photosphere and the chromosphere <ul style="list-style-type: none"> • 0.1" resolution with FOV $> 60''$ (to cover super-granulation and a sunspot) For the off-limb corona and a prominence <ul style="list-style-type: none"> • 0.2" resolution with FOV $> 150''$ (to trace MHD wave propagation) • Consider an option to switch between narrow and wide FOVs

- How the WP links to the statement of task:
The structure of the Sun and the properties of its outer layers in their static and active states
- Category: Infrastructure?
- Primary topic: Solar Physics?
- Secondary topic: Space Weather Research to Operations to Research Loop?