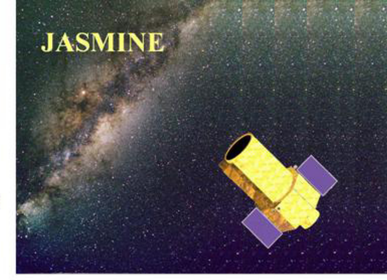


# JASMINE-Astrometric Map of the Galactic Bulge-

## ( Japan Astrometry Satellite Mission for INfrared Exploration)

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## What is JASMINE?

We introduce a Japanese plan of infrared (**z-band:0.9 micron**) space astrometry(JASMINE-project). It will measure parallaxes with the accuracy of **10 micro-arcsec** and proper motions with the accuracy of **4 micro-arcsec/year** for stars brighter than **z = 14 mag**. JASMINE can observe about ten million stars belonging to **the bulge components of our Galaxy**, which are hidden by the interstellar dust extinction in optical bands. Number of stars with $\sigma/\pi < 0.1$ in the direction of the Galactic central bulge is about 1000 times larger than those observed in optical bands, where $\pi$ is a parallax and $\sigma$ is an error of the parallax(see Figures 1 and 2).

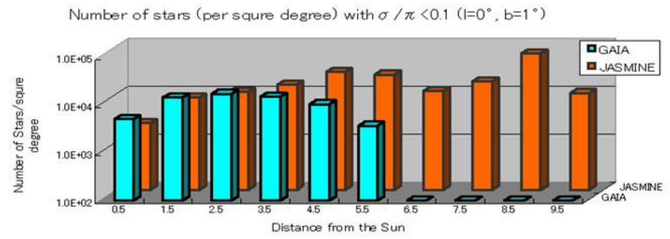



Figure 1

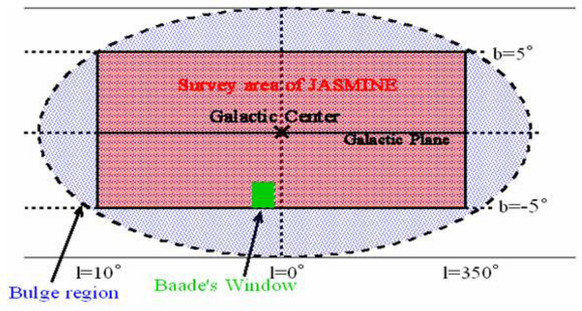



Figure 2: Survey ares of JASMINE
JASMINE: about one million stars of the bulge in the survey area (with $\sigma/\pi<0.1$)
GAIA: 400 stars in the same area as that in JASMINE (with $\sigma/\pi<0.1$)

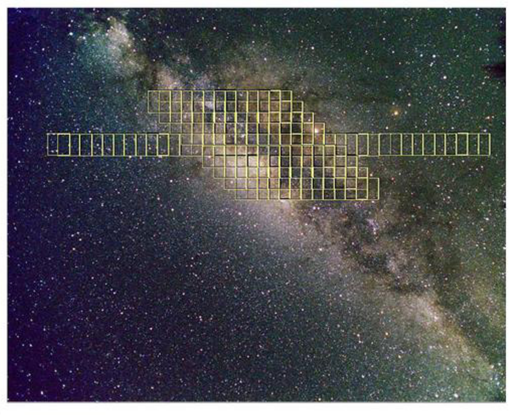
## Objective of JASMINE

The main objective of JASMINE is to provide very useful and important astrometric parameters for studying fundamental structures and evolutions of the bulge component of the Milky Way Galaxy. We hope that JASMINE will be complementary to GAIA especially for survey of the bulge. Furthermore JASMINE will be very useful also for investigating stars in star formation regions, gravitational lens effects due to disk stars, etc.

## Observing Strategy

The JASMINE spacecraft surveys an area of $20^\circ \times 10^\circ$ toward the Galactic bulge(see Figure 2) with a period of about 14 hours. JASMINE has a single telescope with a $0.62^\circ \times 0.62^\circ$ field of view. We will take star images within this field of view with the integration time of 24 seconds. One set of stellar images within a field of view is termed ``a small frame". On this frame the relative positions (centroids) of stars will be determined with the accuracy of about 520 micro-arcseconds. The telescope moves toward another adjacent field of view (small frame) which overlaps the previous small frame (overlapping area is about a half of the frame).
In about 14 hours, the telescope takes the star images over the whole survey region ( $20^\circ \times 10^\circ$ ) covered by about 2050 small frames (See Figure 3).

**Figure 3 Small Frames**



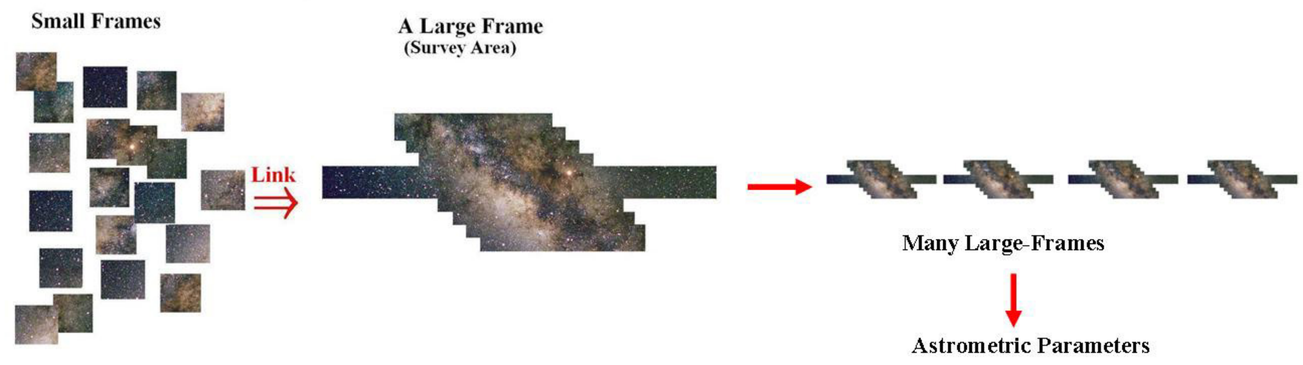



**Figure 4 Frames-Link Method**

Small frames are linked together by many stars in the overlap region of each small frame, covering the whole region of the survey. This linked whole region with the small frames is termed ``a large frame''(see Figure 4). On a large frame, relative positions of stars can be determined with the accuracy of less than about 367 micro-arcsecond.
We repeat the above procedure until the mission life and finally we will get about 2700 large frames. Each large frame covers the survey area of $20^\circ \times 10^\circ$ which is common to the other large frames. Combining these large frames we will deduce the 5 astrometric parameters with the targeted accuracy.

## Instrument

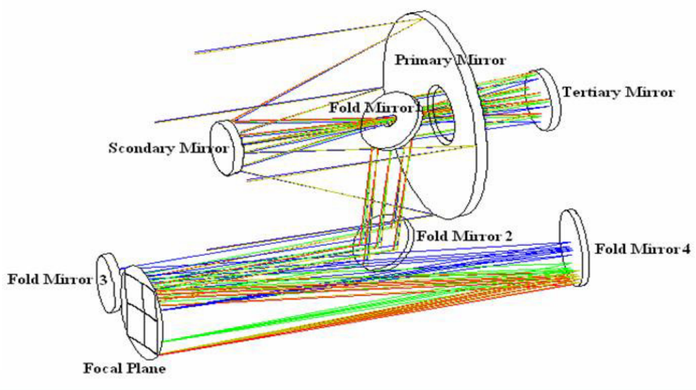



**Figure 5 Optics design**

**Optics design:** Modified Korsch System (3mirrors) (See Figure 5)
**Material:** Reaction-sintered SiC or ULE or ZPF(candidates)
**Aperture size:** 0.75m
**Focal length:** 22.5m
**Field of view:** $0.62^\circ \times 0.62^\circ$
**Detector:** Back illuminated full depletion CCD (z-band:See Figure 6)
**Detector size:** 3cm×3cm(2K×2K)
**pixel size:** 15μm, **pixel on sky:** 138mas, **Number of detectors:** 64(8×8)

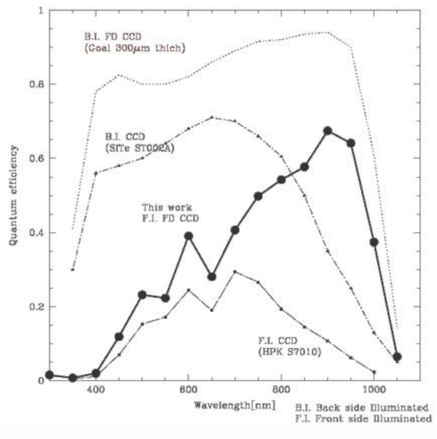



**Figure 6 Quantum Efficiency**

## General Parameters

**Mission life :** ~ 5yr-8yr
**Launcher:** M-V type or H-IIA (dual launch)
**Orbit:** some candidates ( See Figure 7)

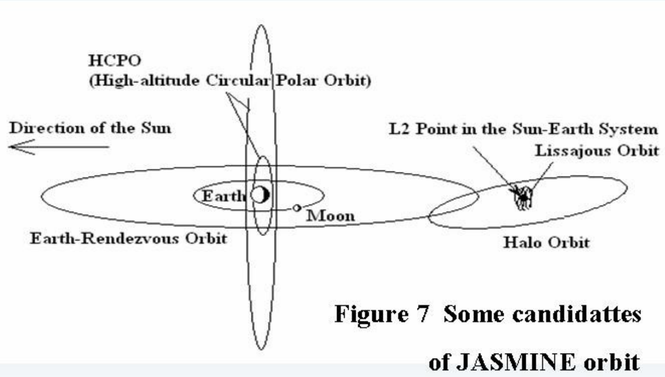
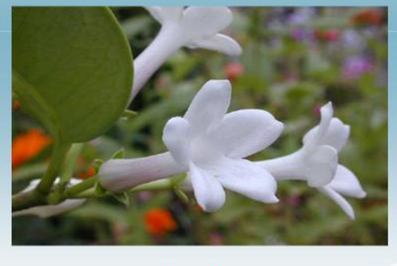



**Figure 7 Some candidattes of JASMINE orbit**



Jasmine