

Europa Clipper	
PIMS: Key Instrument Parameters	
Ion Energy Range	0.1 – 50 eV/q, 0.02 – 7 keV/q
Electron Energy range	0.1 – 50 eV, 0.01 – 2 keV
Energy Resolution	<15%
Sensitivity	0.5 – 10 <sup>5</sup> pA/cm <sup>2</sup>
Time Resolution	1 – 4 s

JUICE									
Key Instrument Parameters									
PEP-JEI		PEP-JoEE		PEP-JDC		PEP-JENI		PEP-JNA	
Ion Energy Range		Ion Energy Range		Ion Energy Range	1 eV – 41 keV	Ion Energy Range	500 eV – 5 MeV	Ion Energy Range	
Electron Energy Range	1 eV - 55 keV	Electron Energy Range	25 keV – 1 MeV	Electron Energy Range		Electron Energy Range		Electron Energy Range	
Neutral Energy Range		Neutral Energy Range		Neutral Energy Range		Neutral Energy Range	500 eV – 300 keV (ENA)	Neutral Energy Range	10 eV – 3.3 keV (ENA)
Energy Resolution	8%	Energy Resolution	20%	Energy Resolution	12%	Energy Resolution	<14%	Energy Resolution	100%
Time resolution	2D per 512 ms / 3D per 4.1 s	Time resolution	1 s	Time resolution	2D per 250 ms / 3D per 8 s	Time resolution	≤10 s (ions) ≤5 min (ENA)	Time resolution	15 s nominal

ECM: Key Instrument Parameters	
Calibrated vector data uncertainty	<= 1.18 nT
Range	± 4000 nT
Precision	<= 0.3 nT
Baseline stability	< 0.25 nT over 43 days
Spacecraft magnetic field knowledge	< 0.5 nT
Sampling rate	16 samples / sec

J-MAG: Key Instrument Parameters	
Absolute Accuracy	0.1 nT
Range	± 8000, ± 50000 (MAGOBS), ±16000(MAGIBS), 0-50000 (SCALAR)
Resolution	3 pT (scalar)/15pT(fluxgate, in ±8000nT range)
Baseline stability	0.2 nT (long term), 0.1 nT (short term)
Sampling rate	32-128 vectors/sec

RPWI: Key Instrument Parameters	
Electrons and ions	Number densities: 10-4 to 105/cm <sup>3</sup> (with 20% accuracy) Electron temperature: 0.01 to 100 eV (with 20% accuracy) Bulk ion drift speed: 0.1 to 200 km/s (with 20% accuracy) Ion temperature: 0.02 to 20 eV
Plasma waves	Electric field variations: up to 1.6 MHz Magnetic field variations: 0.1 Hz-20 kHz. Spectral sensitivity (f>500Hz): 2 uV/m/sqrt(Hz) Angular and phase accuracy: 3 deg Amplitude accuracy: 3 dB
Radio waves	Frequencies: up to 45 MHz Accuracy of polarization: 10% Absolute flux calibration accuracy: 3dB Accuracy on direction of arrival: 1 degrees
DC electric fields	Electric field: DC <1 Hz range Amplitude accuracy: 0.1 mV/m
Spacecraft potential	±100 V (with 10% accuracy)

PRIDE: Key Instrument Parameters	
Wavelength	X-band (Ka-band optional)
Lateral position (1σ precision)	0.3 nrad (ICRF, S/C)

Overview Comparison		
Type	Europa Clipper Instrument	JUICE Instrument
UV Spectrograph	Europa-UVS	UVS
Camera System	EIS	JANUS
NIR Spectrometer	MISE	MAJIS
Ice Penetrating Radar	REASON	RIME
Magnetometer	ECM	J-MAG
Plasma Instrument	PIMS	PEP
Radio Emission		RPWI
Thermal Emission	E-THEMIS	
Mass Spectrometer	MASPEX	PEP-NIM
Dust Analyzer	SUDA	
Radio Science	Gravity	3GM
Very Long Baseline Interferometry		PRIDE
Sub Millimeter Wave		SWI
Laser Altimeter		GALA

Europa Clipper	
Europa-UVS: Key Instrument Parameters	
Wavelength Range	55 – 210 nm
Field of View	0.1° x 7.3°
Spatial Resolution	0.16° (low res); 0.06° (high res) Nyquist sampled
Spectral Resolution	$\lambda/\Delta\lambda = 220$ ; <0.6 nm FWHM (point source)
Spectral Cube Size	2048 (spectral) x 512 (spatial)

JUICE	
JUICE-UVS: Key Instrument Parameters	
Wavelength Range	55 – 210 nm
Field of View	0.1° x 7.3°
Spatial Resolution	up to 175 m/px at Ganymede and up to 234 km (typically 374 to 657 km) at Jupiter.
Spectral Resolution	<0.6 nm FWHM (point source) and <1.2 nm (extended sources)
Spectral Cube Size	2048 (spectral) x 512 (spatial)

Europa Clipper	
REASON: Key Instrument Parameters	
Dual Frequencies	60 MHz ( $\lambda = 5$ m) Very High Frequency (VHF) globally, and 9 MHz ( $\lambda = 33.3$ m) High Frequency (HF) anti-Jovian
Vertical Resolution	Shallow sounding: VHF with <30 m resolution from depths down to 3 km; Full-depth sounding: VHF (coarser) or HF with <300 m resolution and VHF (finer) with <30 m resolution from 3 to 30 km depths; Altimetry: VHF with <15m resolution
Antenna	2 deployable HF and 4 VHF dipole antennas mounted on solar array
Radiated Power	10 - 30 W

JUICE	
RIME: Key Instrument Parameters	
Central Frequency	9 MHz (1 and 3 MHz bandwidth)
Vertical Resolution	9 km depth with vertical resolution of up to 50-140 m in ice.
Antenna	1 deployable HF

Camera System		
EIS: Key Instrument Parameters		
	NAC	WAC
Detector	4096 x 2048 rad-hard CMOS	
Wavelength Range	Panchromatic plus 6 filters (350 – 1050 nm) (370 – 1050 nm)	
Instantaneous Field of View	10 $\mu$ rad (0.5 m/pixel at 50 km)	218 $\mu$ rad (11 m/pixel at 50 km)
Field of View	2.347° x 1.173°	48° x 24°

JANUS: Key Instrument Parameters	
	NAC
Detector	1504 x 2000 rad-hard CMOS
Wavelength range	Panchromatic plus 13 filters (340 – 1080 nm)
Instantaneous Field of View	15 $\mu$ rad up to 7.5 m/px at Ganymede and up to 10 km (typically 16 to 28 km) at Jupiter.
Field of View	1.72° x 1.29°

Mass Spectrometer	
MASPEX: Key instrument Parameters	
Mass Range	2 – 500 u
Mass Resolution	$m/\Delta m \geq 16,988$
Min. Density	10 <sup>6</sup> /m <sup>3</sup>
Dynamic range	1,00E+11

PEP-NIM: Key Instrument Parameters	
Mass range	1-1000 u
Mass resolution	$m/\Delta m > 1100$
Min. Density	10 <sup>6</sup> /m <sup>3</sup>

Near-Infrared Spectrometer	
MISE: Key Instrument Parameters	
Wavelength Range	0.8 to 5.0 $\mu$ m (800 – 5000 nm)
Instantaneous Field of View	250 $\mu$ rad
Field of Regard	4.3° across-track x slit width (0.01° = IFOV); along-track up to 60°
Spatial Resolution	10km/pixel full-disk images at 40,000 km range; 25 m/pixel at 100 km range
Average spectral Sampling	10 nm/band
Spectral Cube Size	300 lines x 80 to 300 samples x 451 spectral channels
Cubes Collected	Up to 8 per flyby
Signal-to-noise Ratio	>100:1 from 0.8–2.6 $\mu$ m, 10:1 between 2.6 and 3.2 $\mu$ m, >25 from >3.2 $\mu$ m

MAJIS: Key Instrument Parameters	
Wavelength Range	0.5 to 5.54 $\mu$ m (500 – 5540 nm)
Instantaneous Field of View	150 $\mu$ rad
Field of View	3.44° x 3.44°
Spatial Resolution	up to 75 m/px at Ganymede and up to 101 km (typically 161 to 282 km) at Jupiter.
Average spectral sampling	3.64 nm/band (0.5-2.35 $\mu$ m), 6.48 nm/band (2.25-5.54 $\mu$ m)
Spectral Cube Size	Up to 400 samples x up to 508 spectral channels x <i>N</i> lines (as needed).

Radiation Monitor	
RADMON: Key Instrument Parameters	
Energy Range	0.3 MeV - 40 MeV (Monitor Stack) > ~1 MeV (Dosimeters)
Total Dosimeters	12
Time Resolution	seconds (mode dependent)

RADEM: Key Instrument Parameters	
Electron Energy range	0.3 to 40 MeV
Protons Energy range	5 MeV to 250 MeV
Time resolution	1min (by default, can be reprogrammed)

Gravity / Occultations	
Gravity Science: Key Parameters	
Wavelength	X band
Fanbeam & LGA FOV	$\pm 15^\circ$ by $\pm 50^\circ$ ; 0 to 80° half angle
System Doppler Accuracy	0.07 mm s <sup>-1</sup> (60 s integration time)
Received Signal Strength	4 - 10 dB-Hz min @D/L

3GM: Key Parameters	
Wavelength	Ka +X band
Resolution	0.01 mm s <sup>-1</sup> (60 s integration time)
Range accuracy	<20 cm
PRIDE: Key Instrument Parameters	
Wavelength	X-band (Ka-band optional)
Lateral position (1 $\sigma$ precision)	0.3 nrad (ICRF)
Doppler noise (ad hoc)	0.15 mm s <sup>-1</sup> (60 s integration time)

Thermal Emission	
E-THEMIS: Key instrument Parameters	
Filters	7–14, 14–28, 28–70 $\mu$ m
Resolution	9 - 15 m at 25 km range
Image width	5.7° cross-track (720 pixels)
Radiometric Precision	~2K
Radiometric accuracy	2%

SWI: Key Instrument Parameters	
Frequency	1080-1275 GHz and 530-601 GHz
Spectral Resolving Power	~10 <sup>7</sup>
Spectral resolution	10 <sup>5</sup> Hz
Spatial resolution	1000km/2000km (1200/600GHz) at 15 Rj. 500/1000m (1200/600GHz) at 500km for Ganymede

Dust Analyzer	
SUDA: Key Instrument Parameters	
Mass Resolution	$m/\Delta m \leq 1$ u (FWHM) for $m \leq 200$ u
Dust Grain Properties	Impact Speed Range: 4-7 km/s ( $\Delta \leq 1\%$ ) Charge Sensitivity $\geq 0.25$ fC ( $\Delta \leq 10\%$ ) Grain Size Range: 0.1 – 2 $\mu$ m ( $\Delta \leq 25\%$ )
Surface Resolution	Better than spacecraft altitude
Detection Limits	40 ejecta per second

Laser Altimetry	
GALA: Key Instrument Parameters	
Spot Size	50 m
Vertical Resolution	< 5m
Frequency	up to 50 Hz