Europa Clipper
- Will orbit Jupiter doing flybys of its moon Europa searching for possibilities of habitable conditions
- Has 24 engines
- Will do 50 flybys of Europa, enough to analyze the entire moon's chemical composition
- Launched on Space X's Falcon Heavy Rocket
- Instruments:
    - PIMS
        - The Plasma Instrument for Magnetic Sounding (PIMS)
        - Will study density, temperature and flow of plasma on Europa, which will help scientists determine Europa's ice shell thickness, ocean depth and conductivity
        - Has 4 sensors surrounded by satellite dish like cups (Faraday Cups) that catch plasma and inform researchers of the direction it is coming from
    - Europa Clipper Magnetometer
        - Will measure Europa's magnetic fields and how they vary with time and location.
        - Will allow scientists to confirm that Europa has an ocean as well as its depth and salinity.
        - Will also measure ice shell thickness
    - MISE
        - The Mapping Imaging Spectrometer for Europa will analyze infrared light from Europa and in doing so will map Europa's surface composition in detail
        - Funnels light captured by a prism into a thin line that is separated based on infrared wavelength which can be used to create a picture containing the signatures of atoms and molecules that are present.
    - EIS
        - The Europa Imaging System is a set of cameras, one wide angle, one narrow angle, tasked with mapping Europa's surface.
        - Will send color pictures of Europa back to Earth to study its surface.
        - The wide angle camera will sweep the landscape while the narrow angle camera sends higher definition photos of specific landmarks in the landscape.
    - REASON
        - The Radar for Europa Assessment and Sounding: Ocean to Near Surface will allow for scientists to narrow their research by choosing wave frequencies that will pass

through ice and bounce off of water or salt allowing for study of desired substances.
- Detects how far objects are from the spacecraft, so that objects underneath Europa's ice layer can be easily detected and mapped.
- Will measure ice thickness and measure the ice's internal structure.
- E-THEMIS
    - The Europa Thermal Emission Imaging System will is a thermal imaging system that maps heat from the moon's surface
    - Its primary goal is to search for activity such as cryovolcanoes and regions where the ocean might be closer to the surface of Europa
    - Will target warmer regions of ice which may mean they were recently resurfaced so that other instruments can target these areas to learn more about the moon's subsurface chemistry
- MASPEX
    - Using gasses being expelled from Europa's atmosphere, the Mass Spectrometer for Planetary Exploration will collect these gasses and ionize them to understand their chemical composition.
    - This will help scientists understand Europa's atmospheric makeup and whether there are gasses similar to earth's in its atmosphere.
    - Will also help scientists understand how Jupiter's radiation affects Europa's surface compounds
- Europa Ultraviolet Spectrograph
    - The Europa Ultraviolet Spectrograph measures ultraviolet light emitting from the surface and separates them based on wavelengths for scientists to analyze
    - The different wavelength measurements can help scientists identify substances on the moon.
    - Like a normal camera except instead of seeing visible light it sees ultraviolet light.
- SUDA
    - Like MASPEX, the surface dust analyzer collects debris ejected from Europa's atmosphere into space.
    - Unlike MASPEX which ionizes gasses collected by the instrument, SUDA collects and analyzes physical particles
    - Subsurface geysers sometimes spew debris from Europa into space, and SUDA's job is to collect and analyze that

data to send home to scientists to learn more about Europa's composition.

- Europa Clipper's Vault Plate
    - A tantalum plate containing the word for water in over 100 languages that not only protects the Clipper from Jupiter's radiation, but also celebrates the Earth's diversity and our connection to water.
    - A testament to humanity's diversity and curiosity, this plate exhibits our excitement for discovery