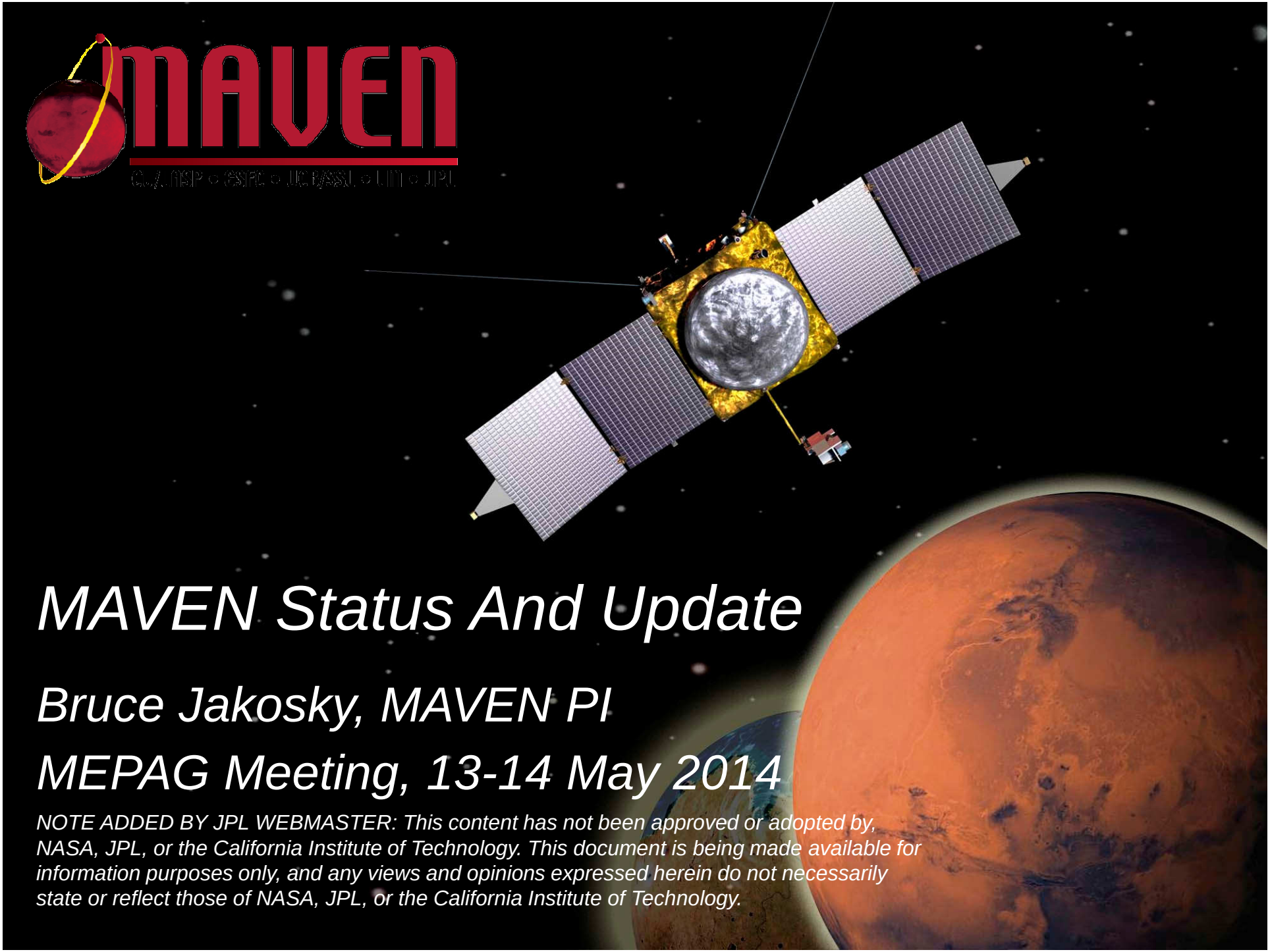



# MAVEN Status And Update

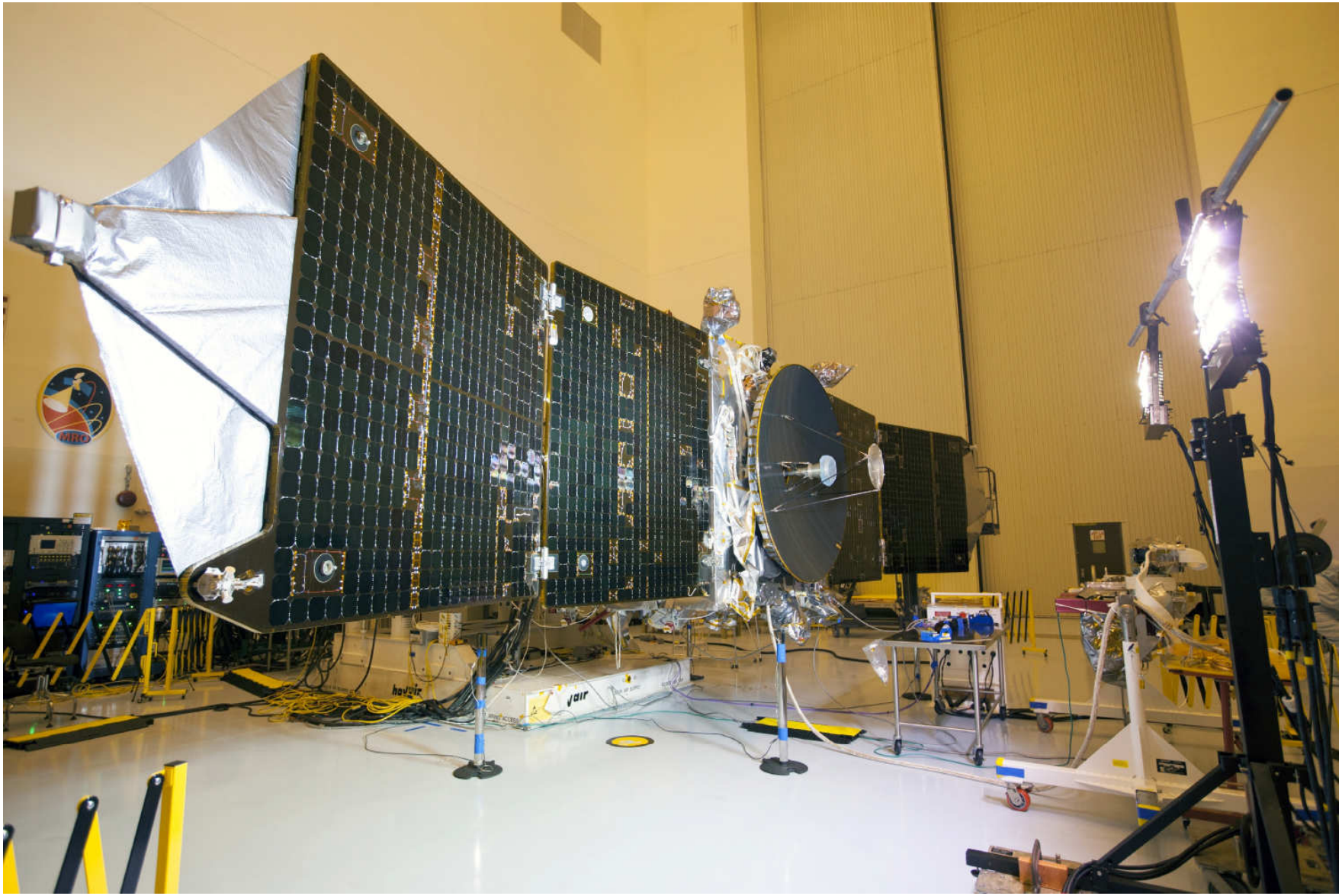
Bruce Jakosky, MAVEN PI

MEPAG Meeting, 13-14 May 2014

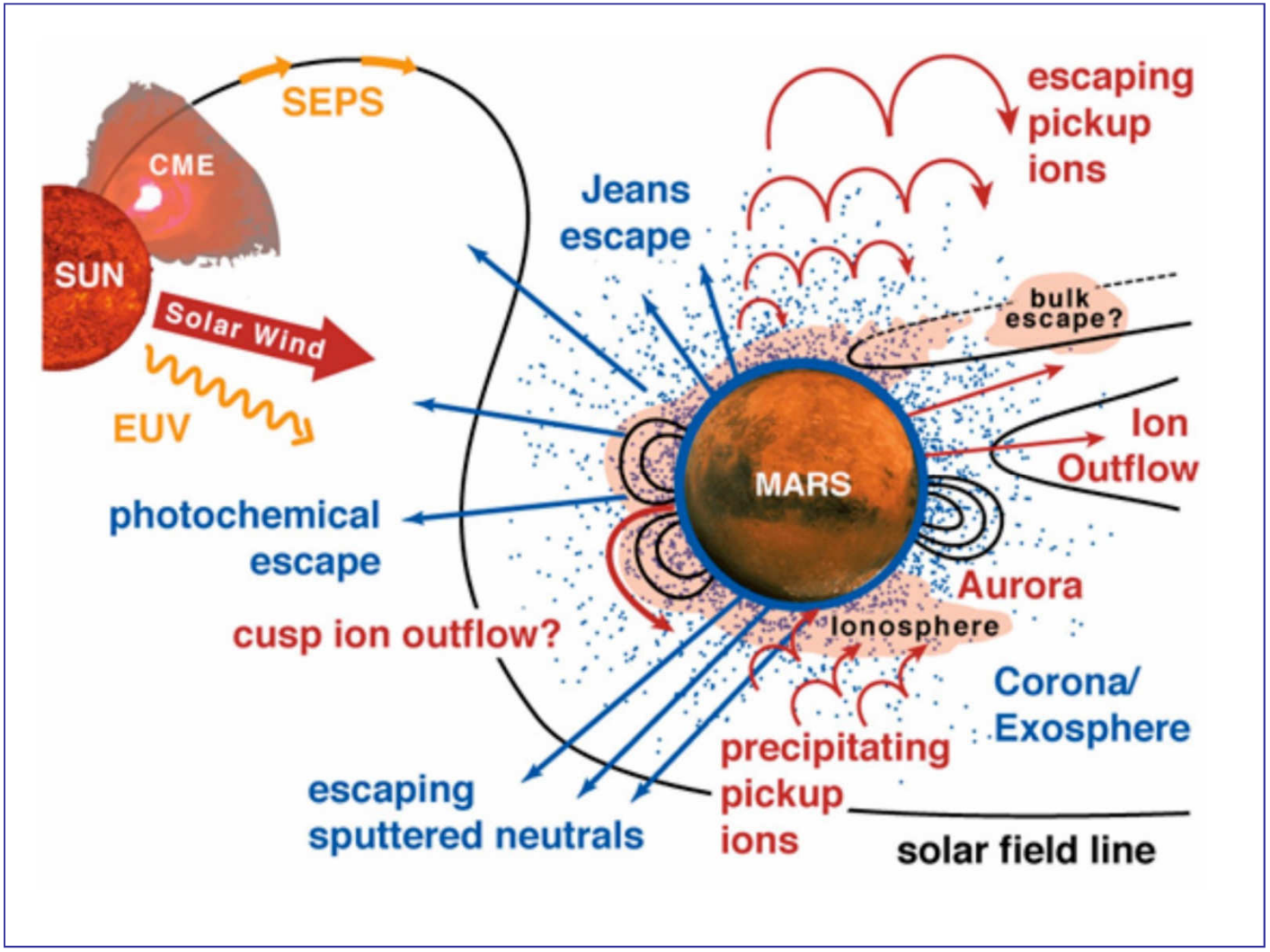
# *Go Atlas, Go Centaur, Go MAVEN!*

MAVEN
Mars Atmosphere and Volatile Evolution Mission
CU/LASP • GSFC • UCB/SSL • LM • JPL

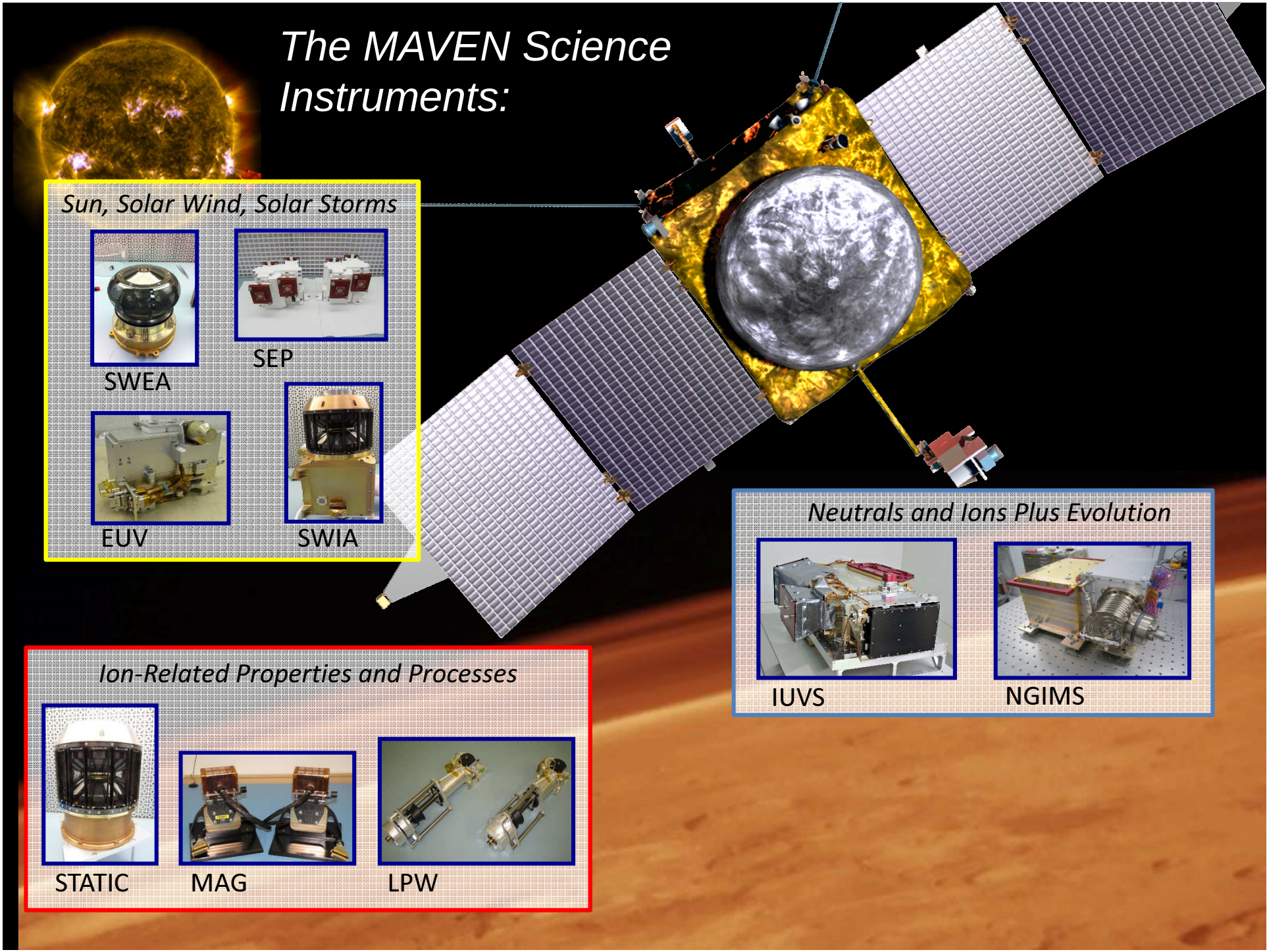
# MAVEN At KSC Undergoing Final Testing



# MAVEN Will Allow Us to Understand Escape of Atmospheric Gases to Space



# The MAVEN Science Instruments:



## Sun, Solar Wind, Solar Storms



SWEA



SEP



EUV



SWIA

## Neutrals and Ions Plus Evolution



IUVS



NGIMS

## Ion-Related Properties and Processes



STATIC



MAG



LPW

# Mission Summary
## (Phase E)

As of 5/5/14

MAVEN
Mars Atmosphere and Volatile Evolution Mission
CU/LASP • GSFC • UCB/SSL • LM • JPL

| Observatory | FEB | MAR | APR |
|---|---|---|---|
| | G | G | G |

| Payloads | FEB | MAR | APR |
|---|---|---|---|
| Remote Sensing Package | G | G | G |
| NGIMS | G | G | G |
| Particle and Fields Package | G | G | G |
| Electra | G | G | G |

| Ground Systems/Mission Operations | FEB | MAR | APR |
|---|---|---|---|
| | G | G | G |

| Management | FEB | MAR | APR |
|---|---|---|---|
| Procurement | G | G | G |
| Cost | G | G | G |
| Schedule | G | G | G |
| Manpower | G | G | G |
| Travel | G | G | G |

| Systems | FEB | MAR | APR |
|---|---|---|---|
| Requirements Analysis | G | G | G |
| Observatory Resources | G | G | G |

**SUMMARY ASSESSMENT**

| | FEB | MAR | APR |
|---|---|---|---|
| TECHNICAL | G | G | G |
| COST | G | G | G |
| SCHEDULE | G | G | G |
| OVERALL | G | G | G |

**LEGEND**

- G — GOOD SHAPE
- Y — MINOR PROBLEM
- R — MAJOR PROBLEM

# Where Is MAVEN Today?

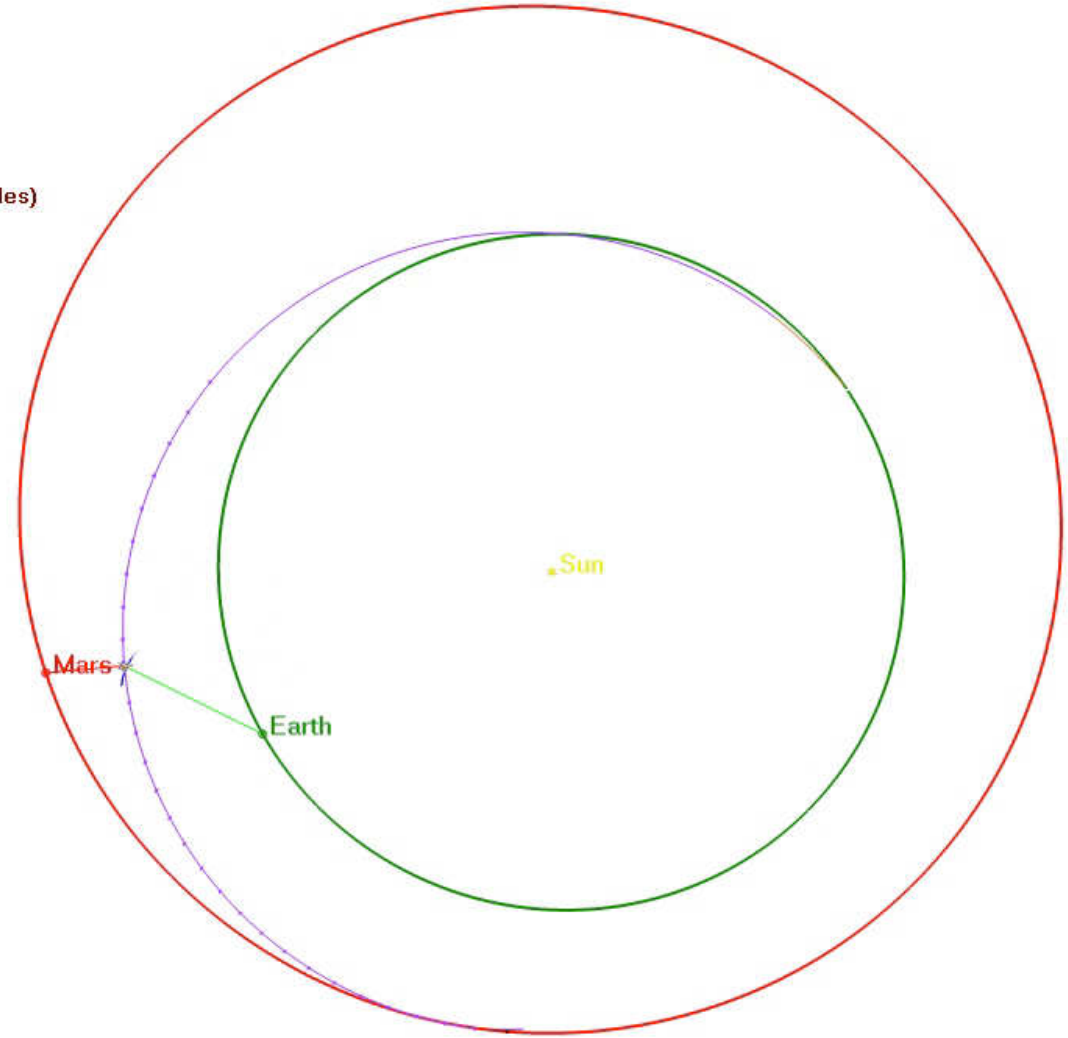
14 May 2014 18:30:00.000
Days to Mars Arrival (MisElap): -130/02:00:00.000

MAVEN Range and Velocity (units of Kilometers)

| | |
|---|---|
| Earth_Range (km): | 70468567 |
| Velocity_wrt_Earth (km/sec): | 13.113 |
| Mars_Range (km): | 37883696 |
| Velocity_wrt_Mars (km/sec): | 5.733 |
| Sun_Range (km): | 199541925 |
| Velocity_wrt_Sun (km/sec): | 24.396 |

MAVEN Range and Velocity (units of Miles)

| | |
|---|---|
| Earth_Range (mi): | 43787137 |
| Velocity_wrt_Earth (mi/sec): | 8.148 |
| Mars_Range (mi): | 23539837 |
| Velocity_wrt_Mars (mi/sec): | 3.563 |
| Sun_Range (mi): | 123989604 |
| Velocity_wrt_Sun (mi/sec): | 15.159 |

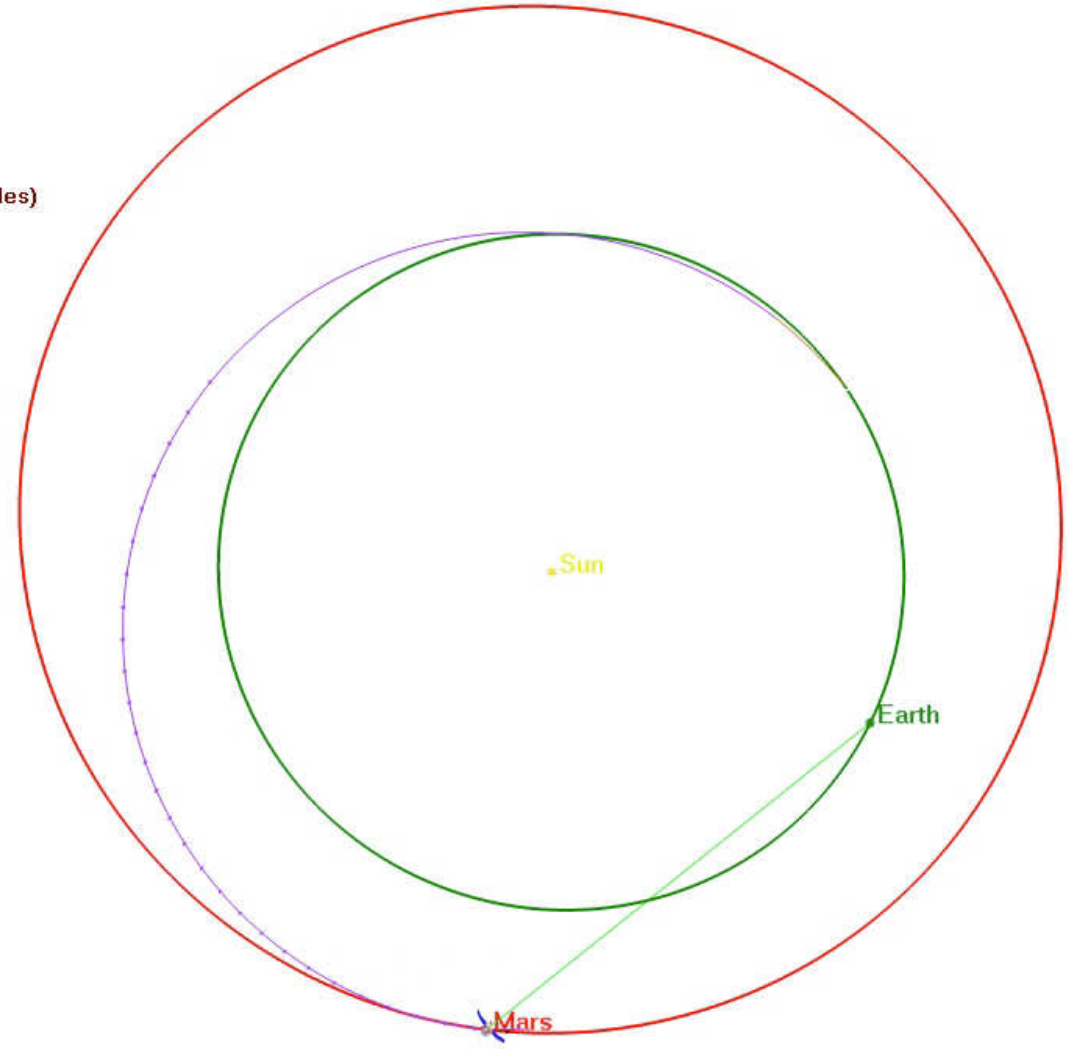


# Geometry At Arrival

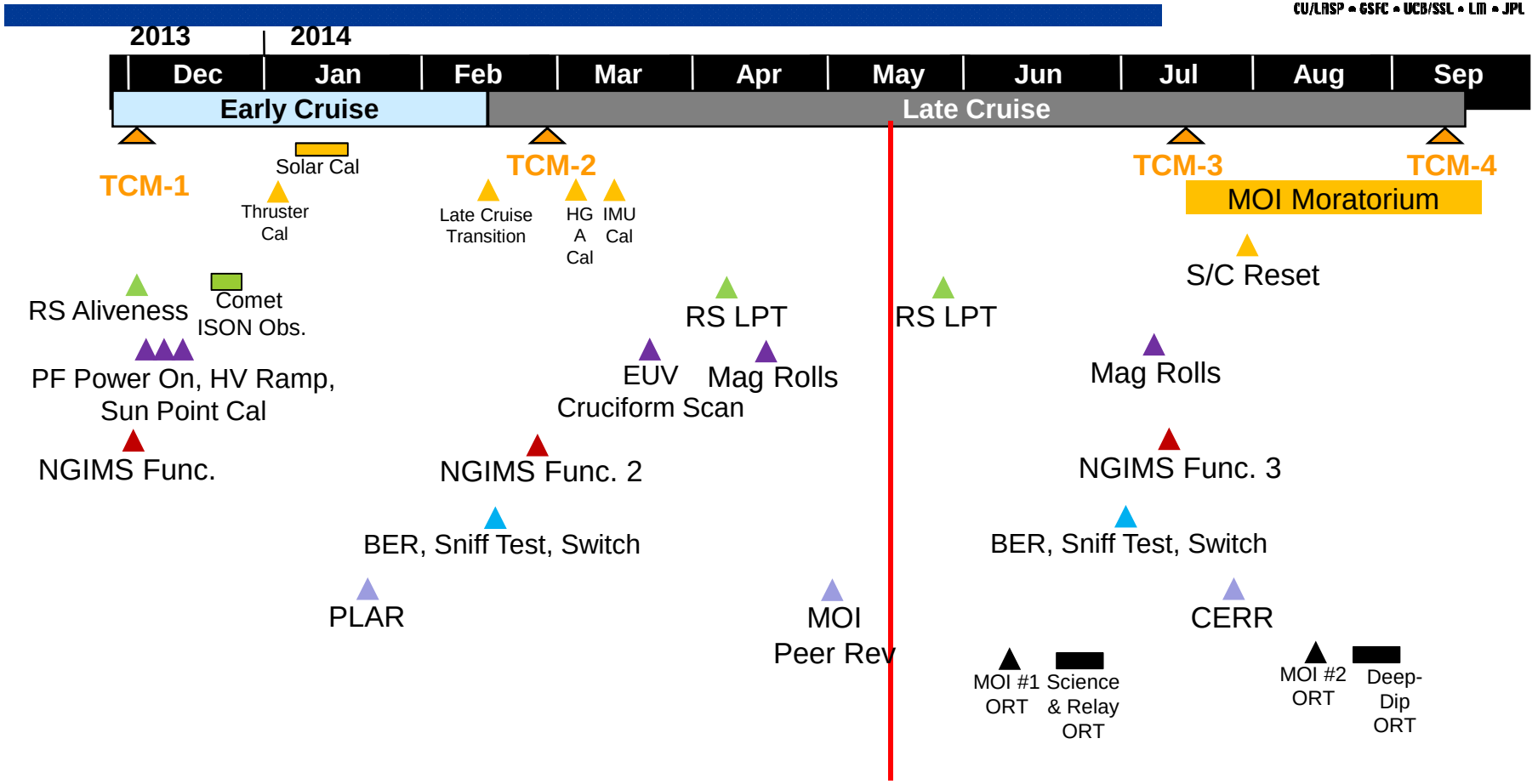
21 Sep 2014 18:30:00.000
Days to Mars Arrival (MisElap): -0/02:00:00.000

MAVEN Range and Velocity (units of Kilometers)
Earth_Range (km): 222340517
Velocity_wrt_Earth (km/sec): 30.181
Mars_Range (km): 95624
Velocity_wrt_Mars (km/sec): 3.324
Sun_Range (km): 213313400
Velocity_wrt_Sun (km/sec): 22.432

MAVEN Range and Velocity (units of Miles)
Earth_Range (mi): 138155992
Velocity_wrt_Earth (mi/sec): 18.753
Mars_Range (mi): 59418
Velocity_wrt_Mars (mi/sec): 2.065
Sun_Range (mi): 132546801
Velocity_wrt_Sun (mi/sec): 13.939



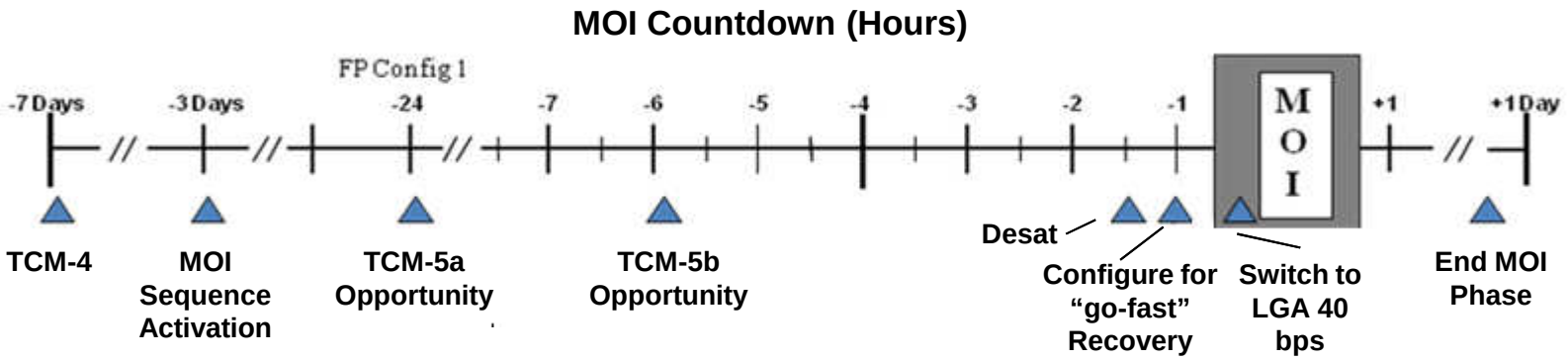
# Cruise Phase Timeline Showing Upcoming Events

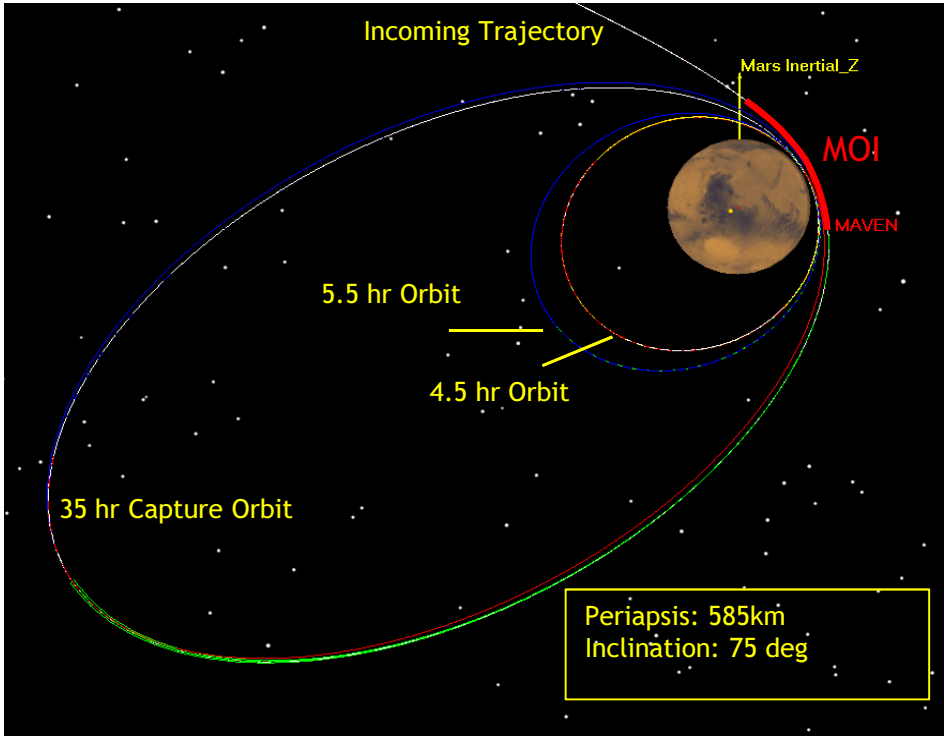



**S/C activity** **P&F activity** **RS activity** **NGIMS activity** **Review** **Electra activity** **Ground activity**

- 10 month ballistic cruise to Mars
  - Arrival 9/22/14
- Split into 2 sub-phases
  - Early Cruise (Launch - L+89 days)
  - Late Cruise (L+90 days – MOI-3 days)
- Four Trajectory Correction Maneuvers (TCM)
- Payload and spacecraft checkouts
  - Beginning after TCM-1
  - Complete prior to MOI Moratorium (MOI-60d)

# Mars Orbit Insertion Process




- MOI will occur on 9/21/14 (ET)
- Sequence activates 3 days out
- Performed 3-day MOI STL test
- 60-day Command Moratorium prior to MOI
- ~34-minute MOI burn; capture into orbit after about 30 minutes

# Key Activities During Transition Phase

- Nominal 5.5-week transition phase to commission spacecraft and get ready for science
- Maneuvers to put us into science mapping orbit
  - Multiple Period Reduction Maneuvers (lower apoapsis) and Periapsis Lowering Maneuvers (lower periapsis)
- Deployment of booms
  - Articulated Payload Platform (IUVS, STATIC, NGIMS); calibration of APP pointing
  - SWEA boom
  - LPW booms
- NGIMS break-of-cap ejection
- Instrument and Electra check-out
- Testing of Periapsis Timing Estimator (PTE) algorithms
- End-to-end test of relay communications with MSL

# Comet Siding Spring Encounter

- Close approach to Mars (~135,000 km) on 19 Oct.
- Analysis of dust risk being coordinated by JPL
- Possible risk mitigation options on the MAVEN spacecraft
  - Phase spacecraft location in orbit to allow shielding by Mars at time of peak risk
  - Point least-vulnerable face of spacecraft into dust flow
  - Spacecraft and instruments in safe state
  - Delay deployment of booms
  - Stay in insertion orbit due to added distance from comet
- Potential science observations
  - Strong desire to make observations of Mars (before/after) and comet
  - Spacecraft and instrument health and safety, and ops team health and safety, are primary considerations
  - Would require interrupting transition phase, and would delay start of science mapping
  - Planning of options in process
- Planned decision date on mitigations and observations of June 2

# MAVEN Status Summary

- The MAVEN spacecraft and instruments are all operating nominally.
- Budget (actuals through launch, estimated through Phase E) will under-run; actual amount being determined as part of annual budget process
- The MAVEN team is fully focused on system checkouts/calibrations, operations, preparation for MOI and for transition phase, and preparations for science
- There are significant events occurring between now and science ops
- Comet Siding Spring mitigation options and science observations are in work, and decisions will be made in early June
- We're on track for Mars Orbit Insertion on September 21st at 10:00 p.m. EDT and for start of science mapping in early November