



# Dust Detection on SDC (Student Dust Counter)

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**SDC Detector Design and Constraints**

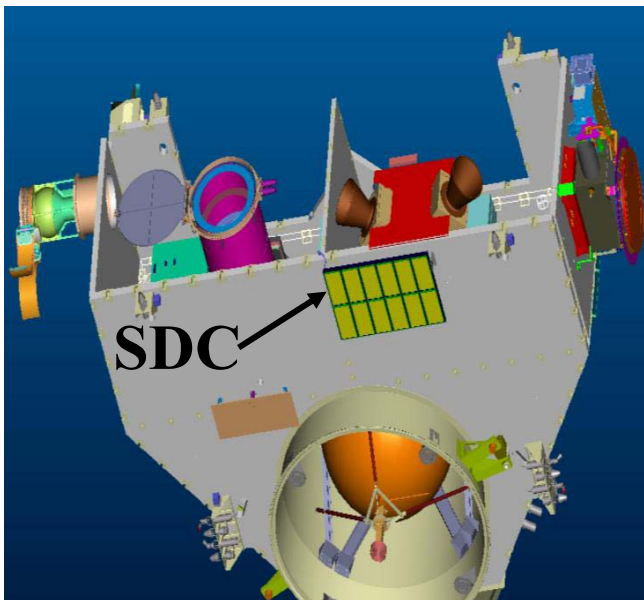
**December 9, 2003**



# The New Horizon's Mission



*“The New Horizons Pluto-Kuiper Belt mission is designed to help us understand worlds at the edge of our solar system by making the first reconnaissance of Pluto and Charon”*



Student Dust counter will fly on the New Horizon's mission to Pluto and its moon, Charon

Launch – January 2006

Will reach Pluto July 2015

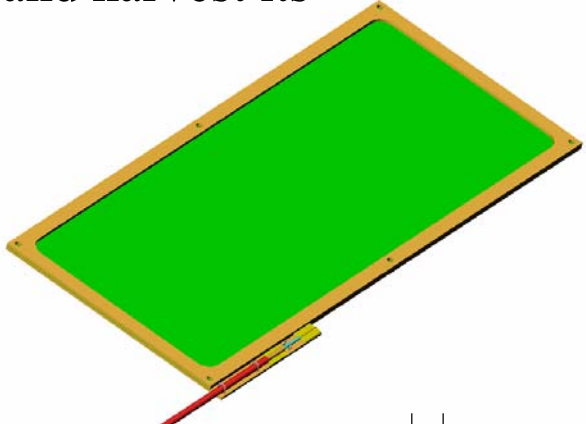
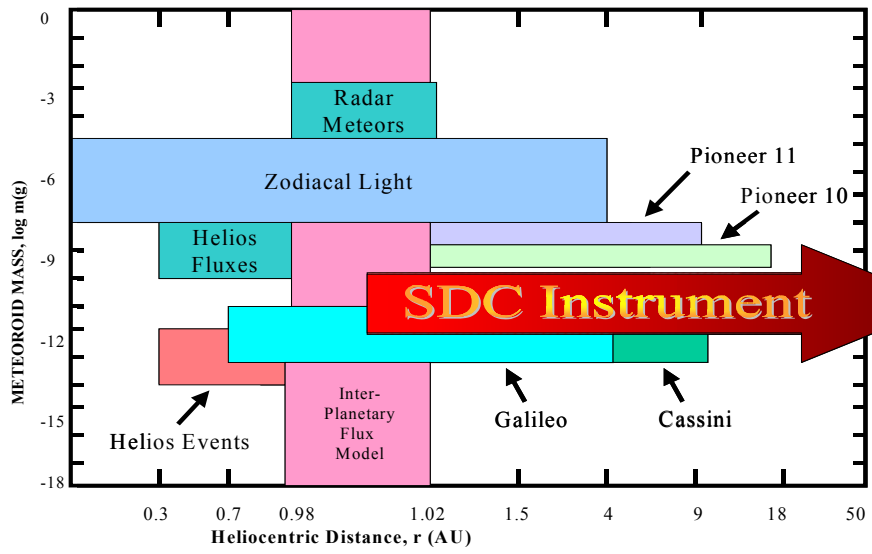


# Student Dust Counter (SDC)

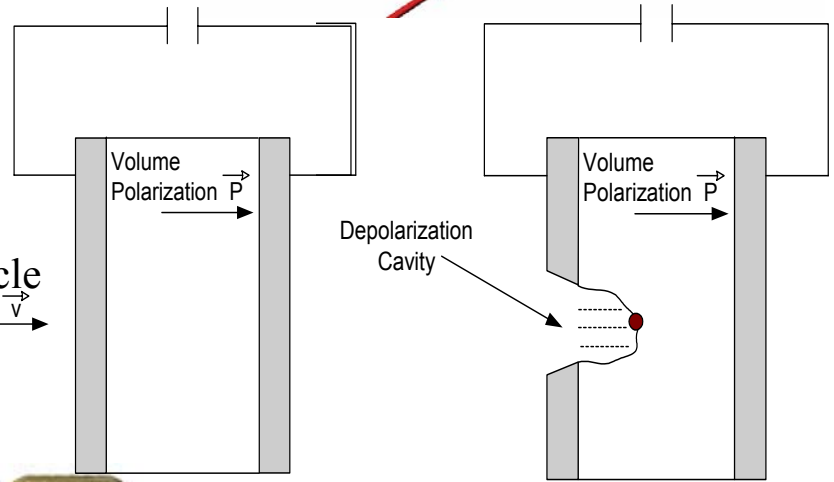
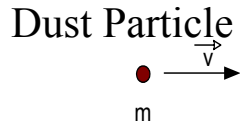


## Student Dust Counter (SDC) of the New Horizons Mission

EPO project: providing a unique opportunity for students to design, build, test, calibrate, operate a deep space instrument and harvest its science!



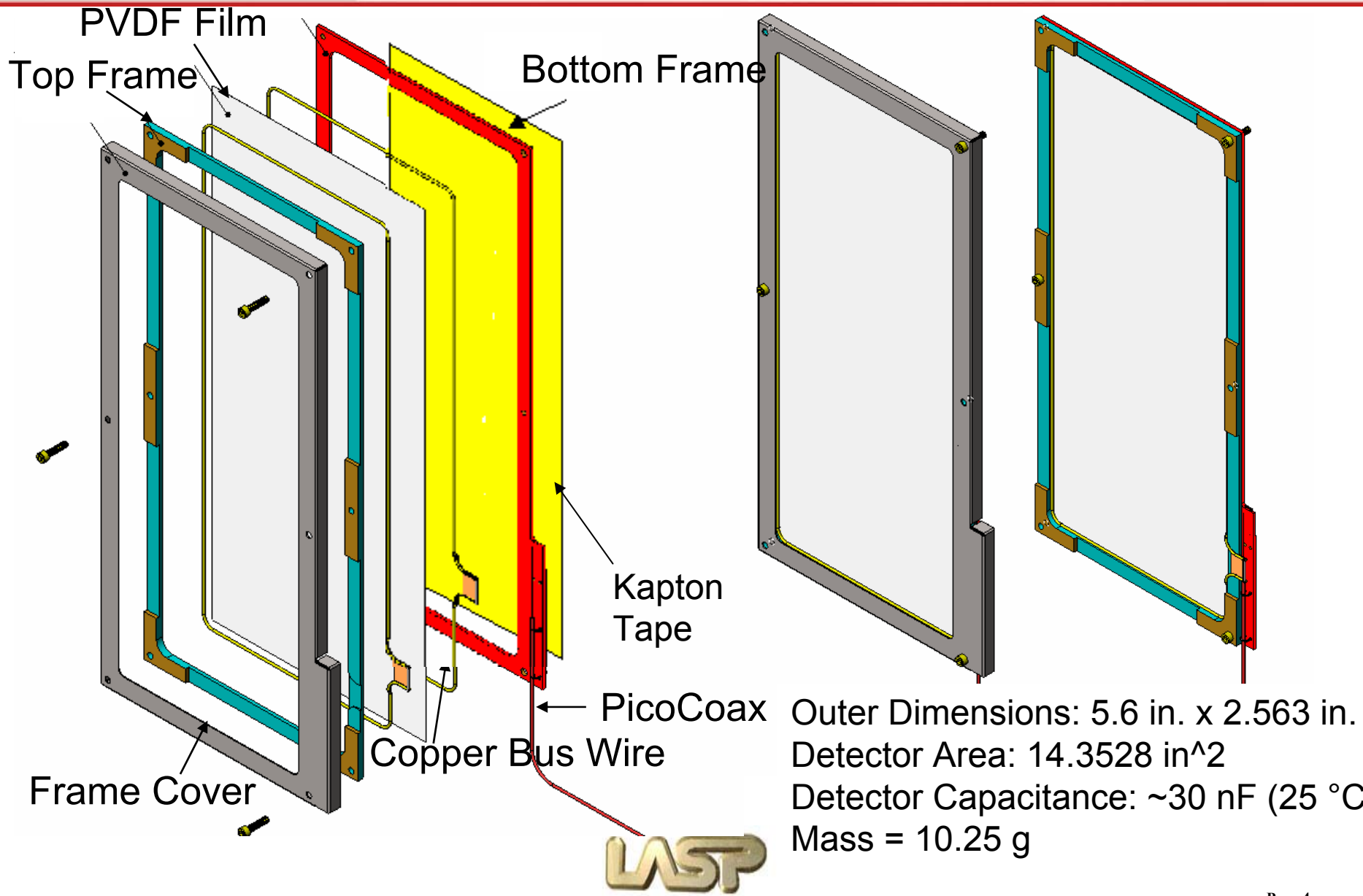
**SDC Temperature Range**  
-120 C to 75 C



PVDF Film

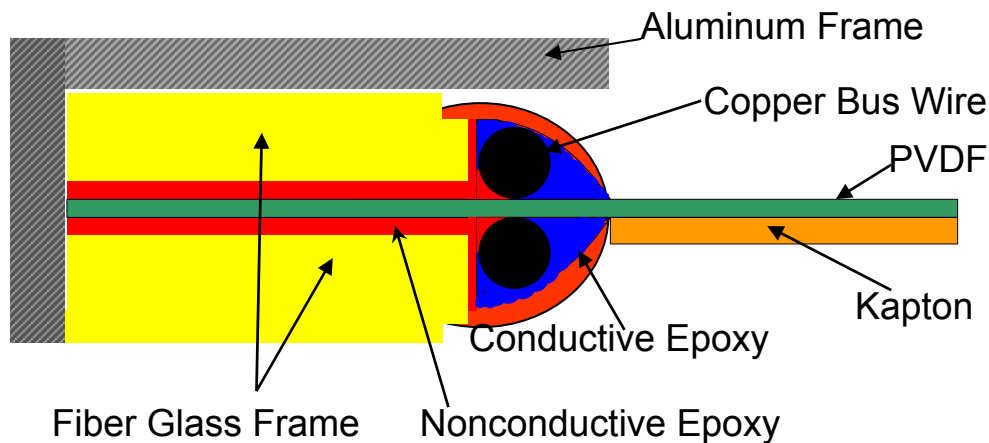


# SDC PVDF Detector Design





# Detector Materials



- **PVDF (Polyvinylidene Fluoride Film)**

- 28  $\mu\text{m}$  thick with 850  $\text{\AA}$  Aluminum and 150  $\text{\AA}$  Nickel on top and bottom surfaces

- **Kapton Tape**

- Temperature increase of PVDF material during third stage burn
- Electrically isolates Detector from Honey comb panel the detectors are mounted to

- **Wire around inner perimeter of frame**

- Longevity of conductive epoxy
- Mitigates dependence on conductive epoxy effectiveness

- **Aluminum Frame Cover**

- Space Charging
- Thermal Constraints





# Detector Materials and Verification



## Electrical Connection

### 36 Gauge Pico Coax - electrical

connection from detector frame to electronics

- Outgassing

CVCM (wt%) = .027

Total Mass Loss (wt%) = .022

### Conductive Epoxy - electrical connection

from PVDF material to detector frame

Masterbond EP21TDCS – MED Conductive Epoxy

- Temperature Range -270 °C to 121 °C

- Outgassing

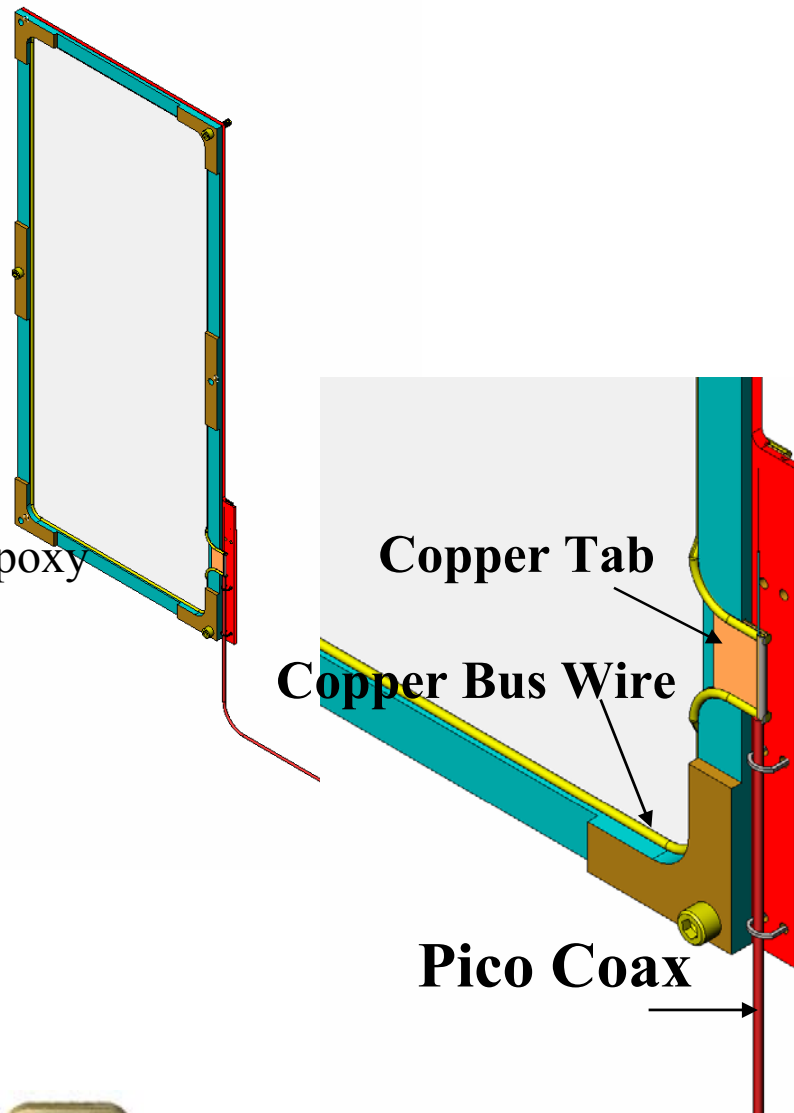
CVCM (wt%) = .044

Total Mass Loss (wt%) = .456

### Nonconductive Epoxy

Scotchweld 2216

- Temperature Range – -250 °C to 82 °C





# References



- [1] J.A. Simpson, A.J. Tuzzolino, Nucl. Instr. And Meth. A236 (1985)
- [2] New Horizons Instrument Specification, Nov. 2003
- [3] Student Dust Counter Instrument Specification Nov. 2003

