

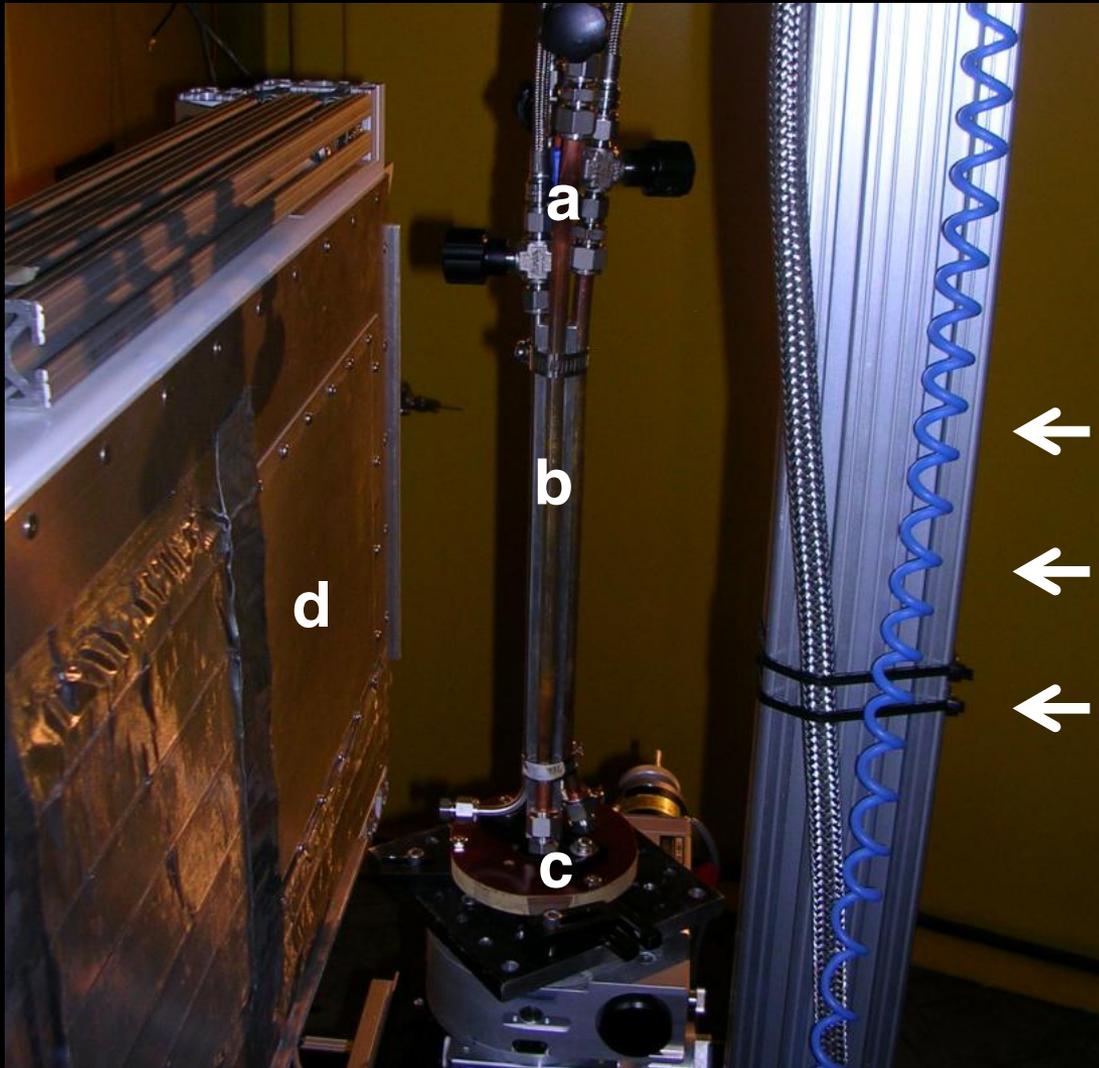
# 4D Tracking of Hydrogen Absorption in $\text{LaNi}_5$

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Directed by Dr. Les Butler

Summer 2011 REU

# Neutron Tomography



**a** – H<sub>2</sub> source;

**b** – Cu and steel pipes with  
LaNi<sub>5</sub>;

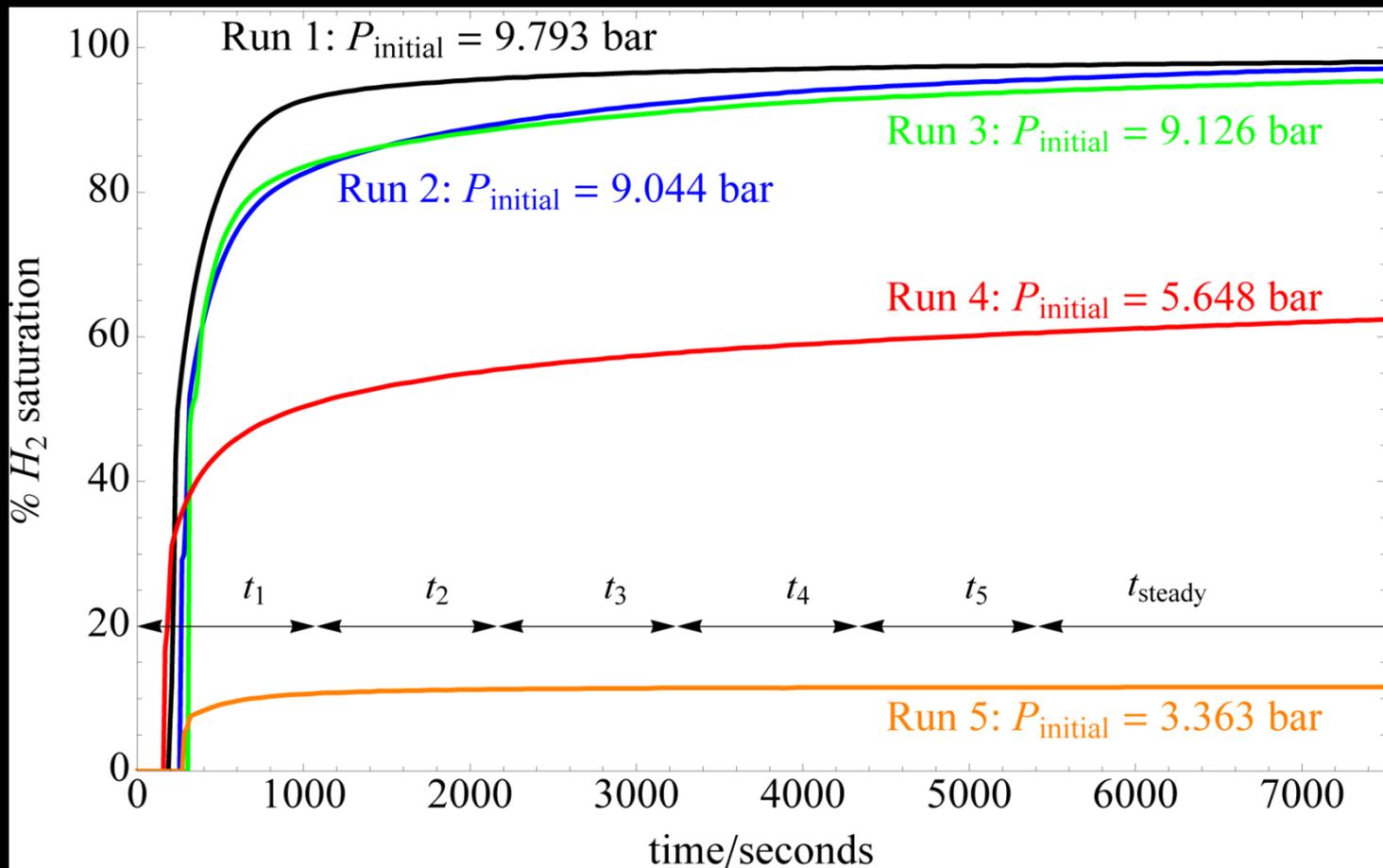
**c** – rotating stage;

**d** – detector;

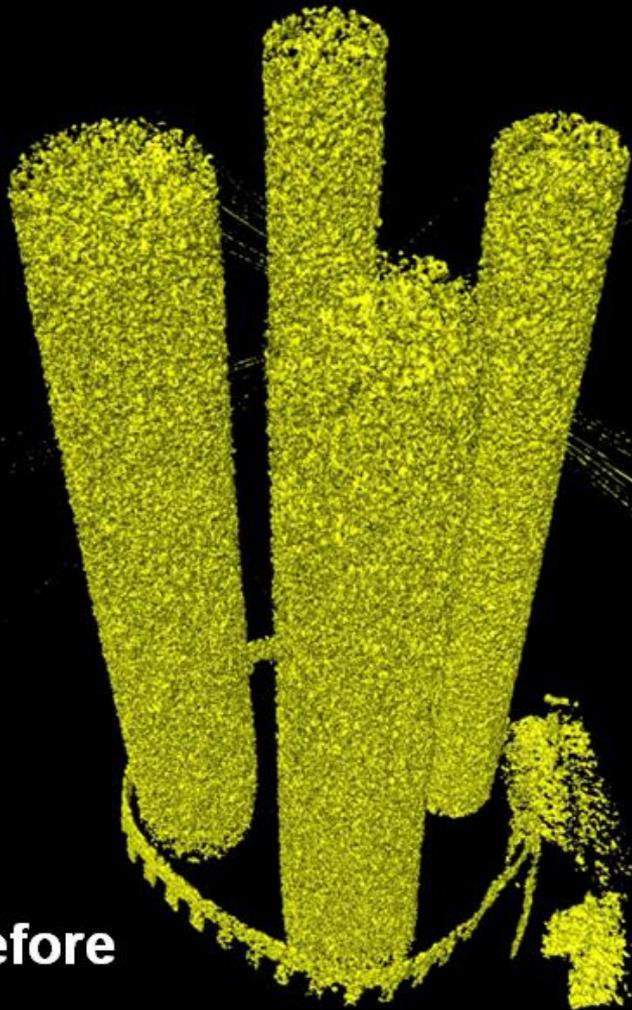
“←” – direction of neutron  
flight from source

# H<sub>2</sub> Saturation of LaNi<sub>5</sub>

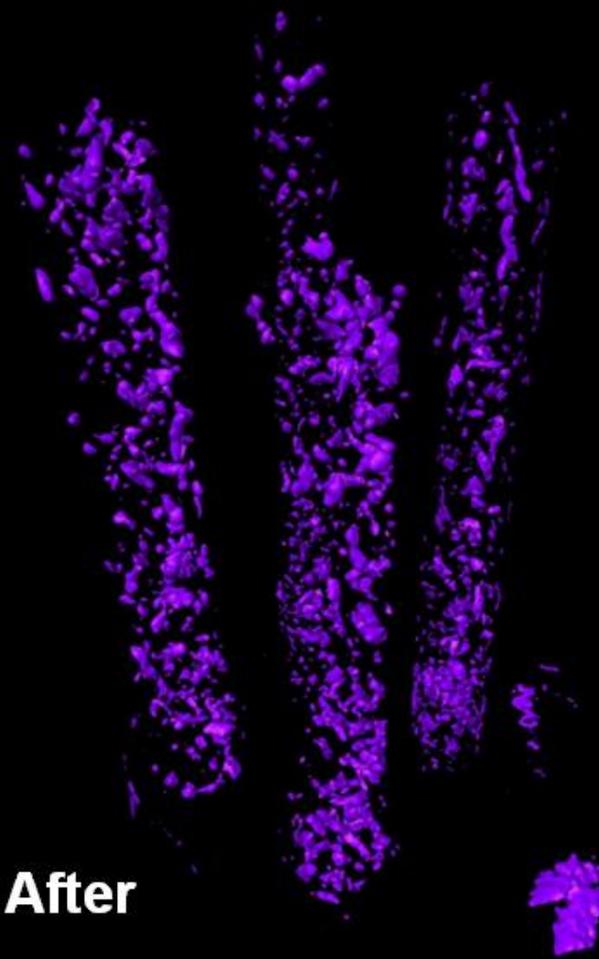
## % H<sub>2</sub> Saturation vs. Time



# 3D Reconstruction in Avizo



Before

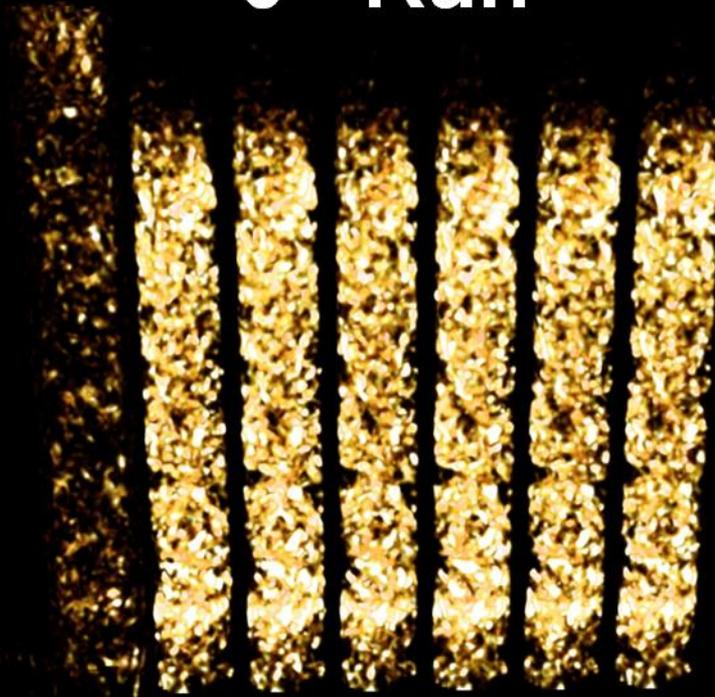


After

# 4D Reconstruction

0<sup>th</sup> Run

~9.793 bar



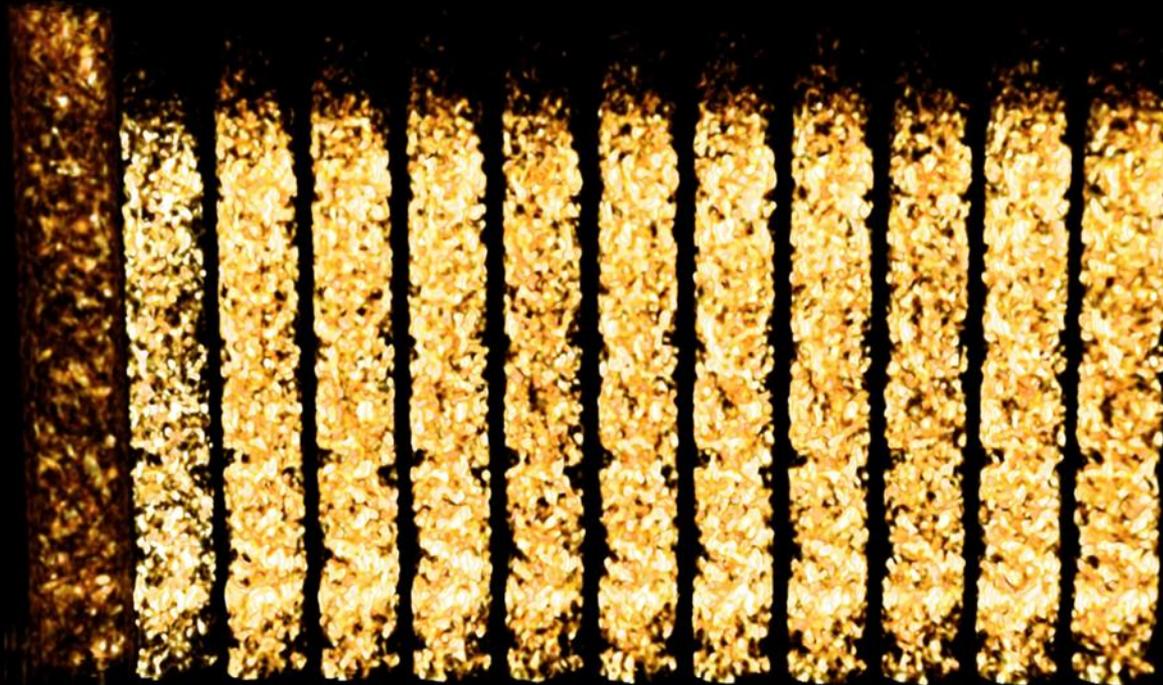
No  $tw_1$   $tw_2$   $tw_3$   $tw_4$   $tw_5$   $tw_{steady}$   
H<sub>2</sub>

1000s Time Windows

# 4D Reconstruction

0<sup>th</sup> Run

~9.793 bar



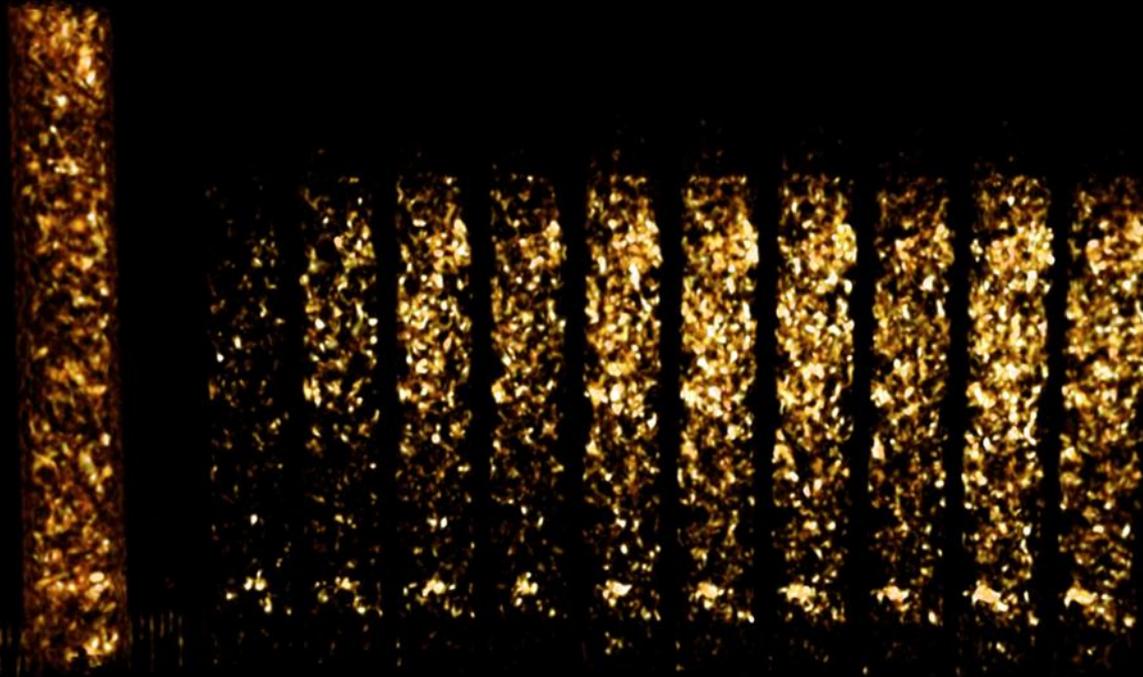
No  $H_2$   $tw_1$   $tw_2$   $tw_3$   $tw_4$   $tw_5$   $tw_6$   $tw_7$   $tw_8$   $tw_9$   $tw_{10}$   $tw_{steady}$

500s Time Windows

# 4D Reconstruction

4<sup>th</sup> Run

~3.410 bar



No  $\text{H}_2$   $\text{tw}_1$   $\text{tw}_2$   $\text{tw}_3$   $\text{tw}_4$   $\text{tw}_5$   $\text{tw}_6$   $\text{tw}_7$   $\text{tw}_8$   $\text{tw}_9$   $\text{tw}_{10}$   $\text{tw}_{\text{steady}}$

500s Time Windows

# 4D Reconstruction

5<sup>th</sup> Run

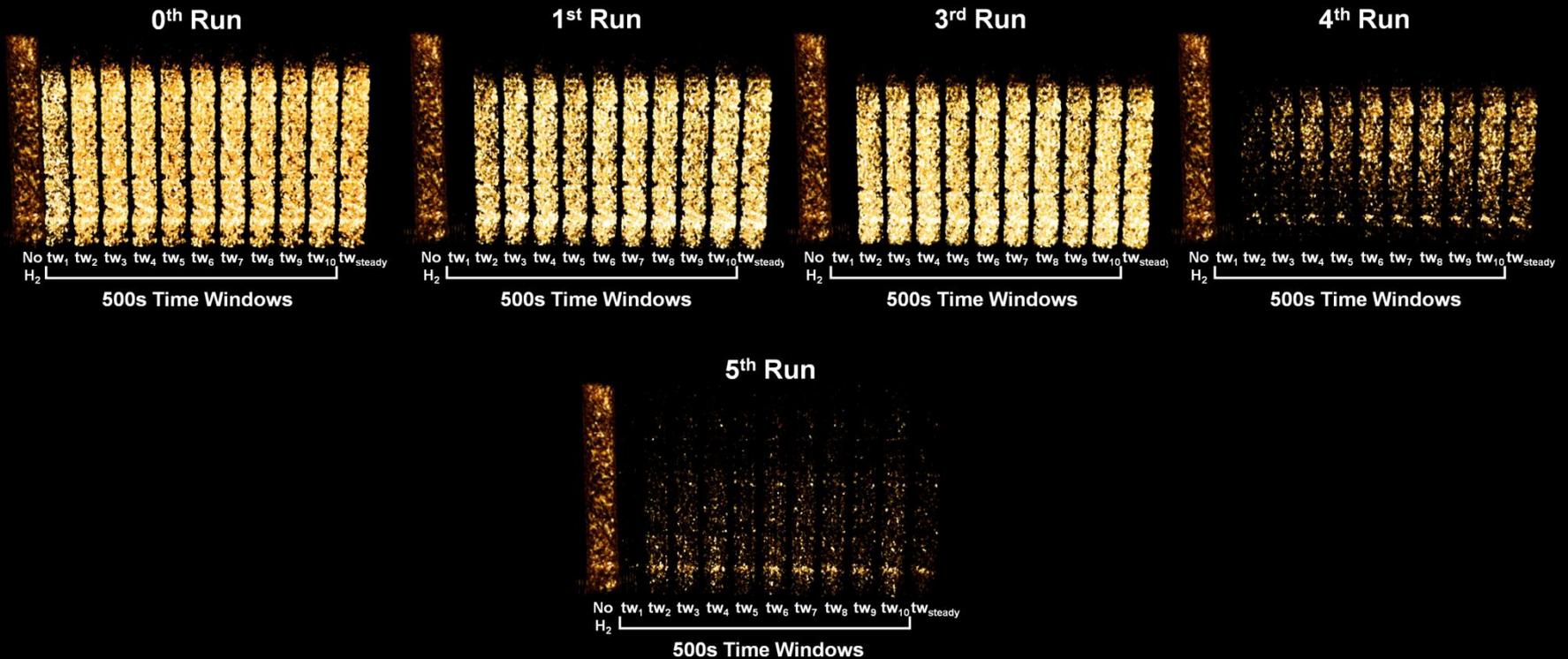
~2.490 bar



No  $tw_1$   $tw_2$   $tw_3$   $tw_4$   $tw_5$   $tw_6$   $tw_7$   $tw_8$   $tw_9$   $tw_{10}$   $tw_{steady}$   
 $H_2$

500s Time Windows

# 4D Reconstruction



# 4D Reconstruction of Individual Grain Tracking

4<sup>th</sup> Run

