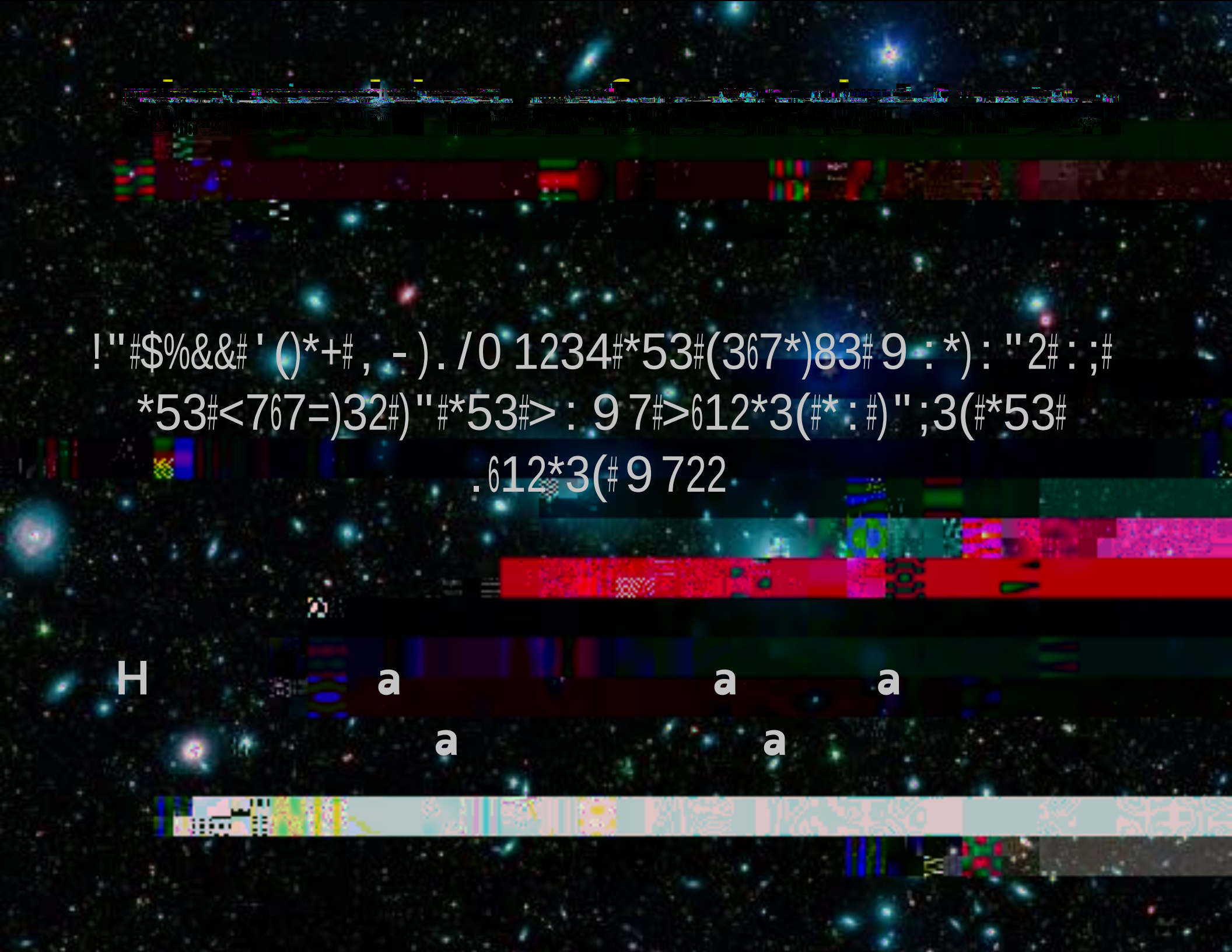
- -

- W a Da Ma
- H a c Da Ma
- S a c Da Ma a SNOLAB


!"#$%&&#'()*+#,-)./0 1234#*53#(367*)83#9:*):"2#:;#
*53#<767=)32#)"#*53#>:9 7#>612*3(#*:#)";3(#*53#
.612*3(#9 722
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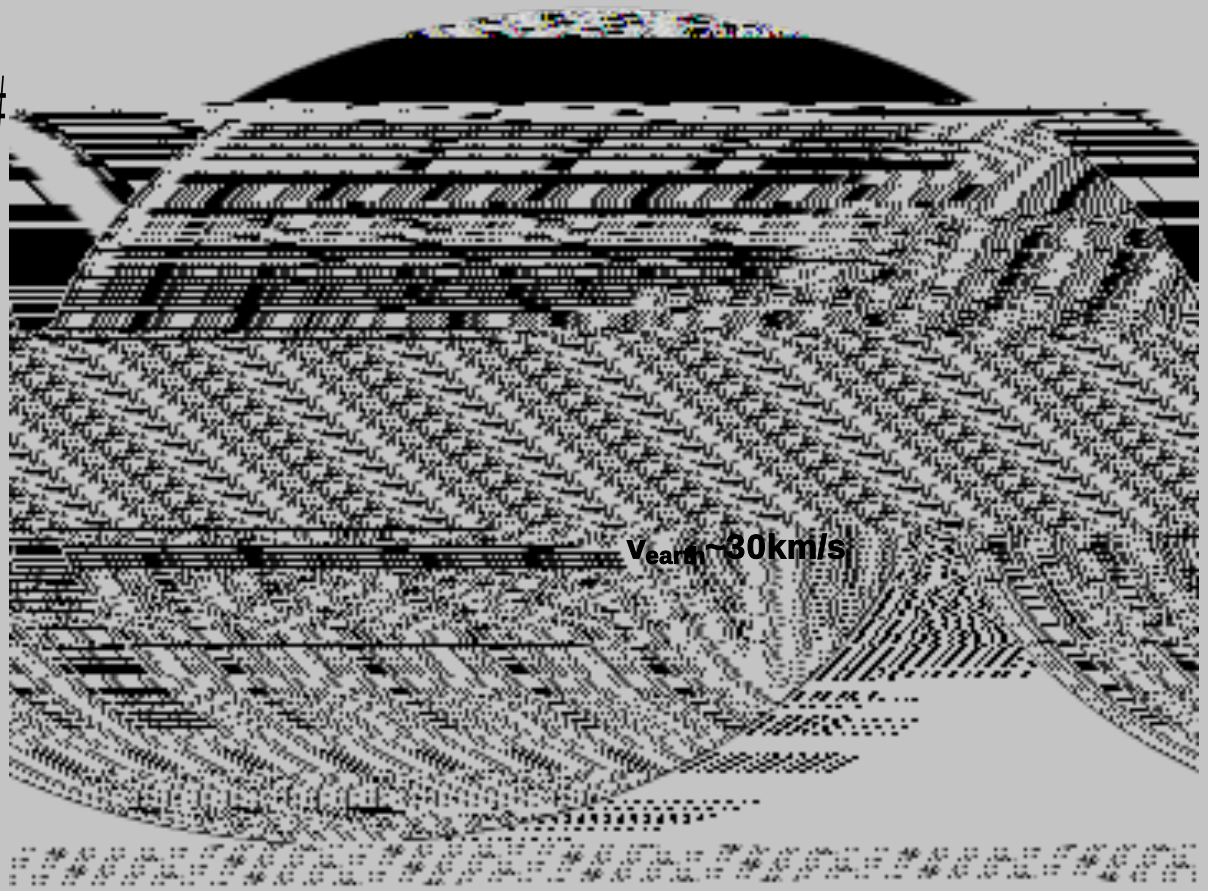
- ? :*): "#:;#*53#21"#
  7(:1"4#*53#<767=0#
)"41.32#7#47(/#
  97**3(#@-)"4A
- B:*7*): "#:;#*53#
  37(*5#7C:1*#*53#
  21"#D(:41.32#7#
  2372:"76#
  9:4167*): "#)"#*53#
  836:.)*0#:;#*53#
  -)"4



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  -))'-#-45'$"+$=-5.>#"?4,$
  >-1-@3'*$5-4$='$?*',$%"$
  /'-*?#'$%&'$/-**$-4,$/-**$
  ,3*%#3=?%3"4$"+$+"#'>#"?4,$
  "=A'5%*

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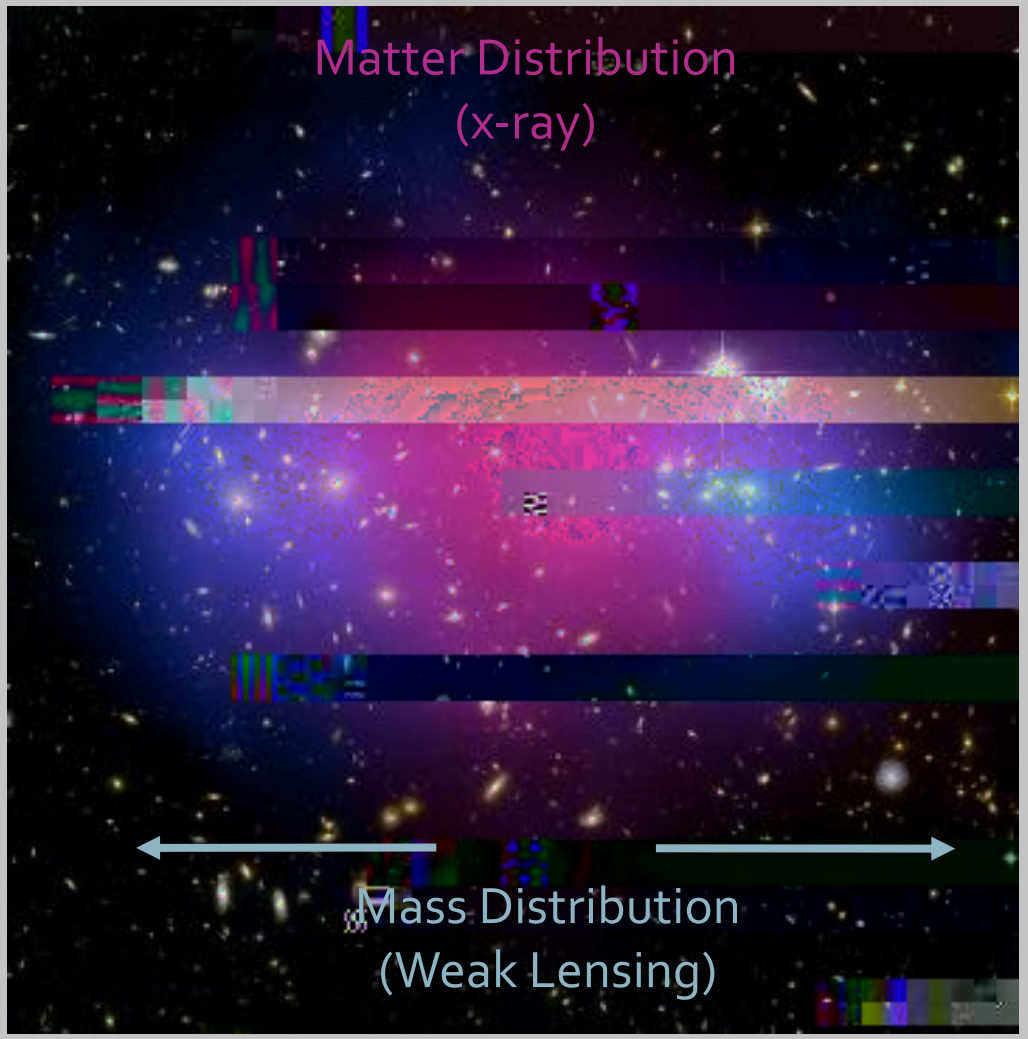

[illegible]

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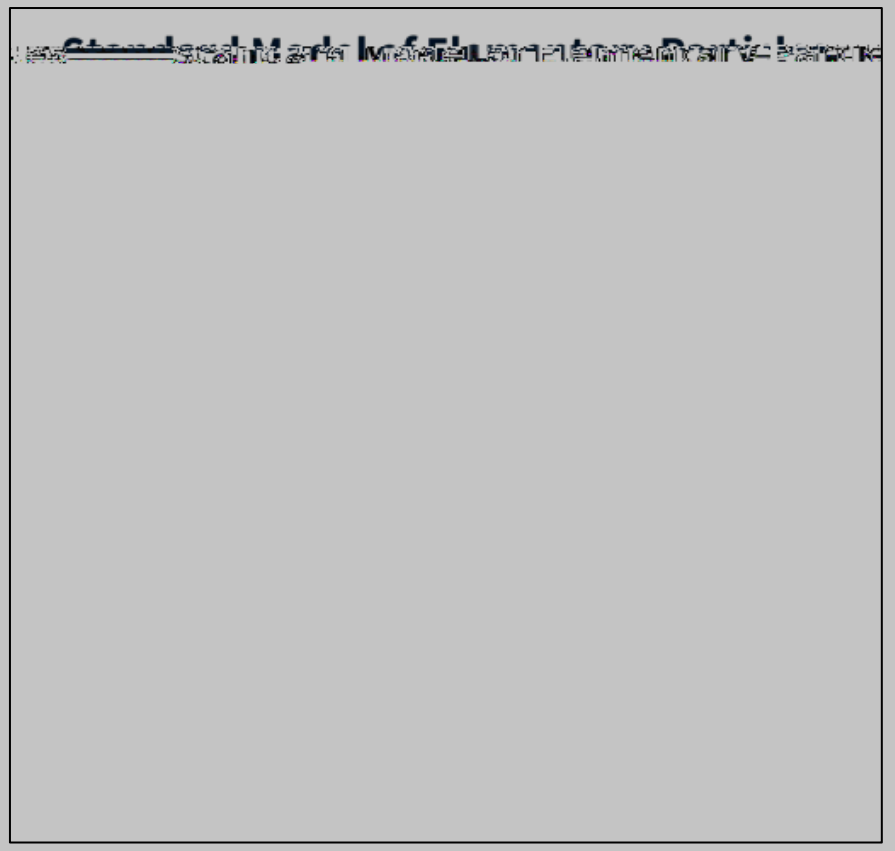
a a

- G a a a e ac
- Ne a
- L ed
- N ba c
- C d e e a c a ea e



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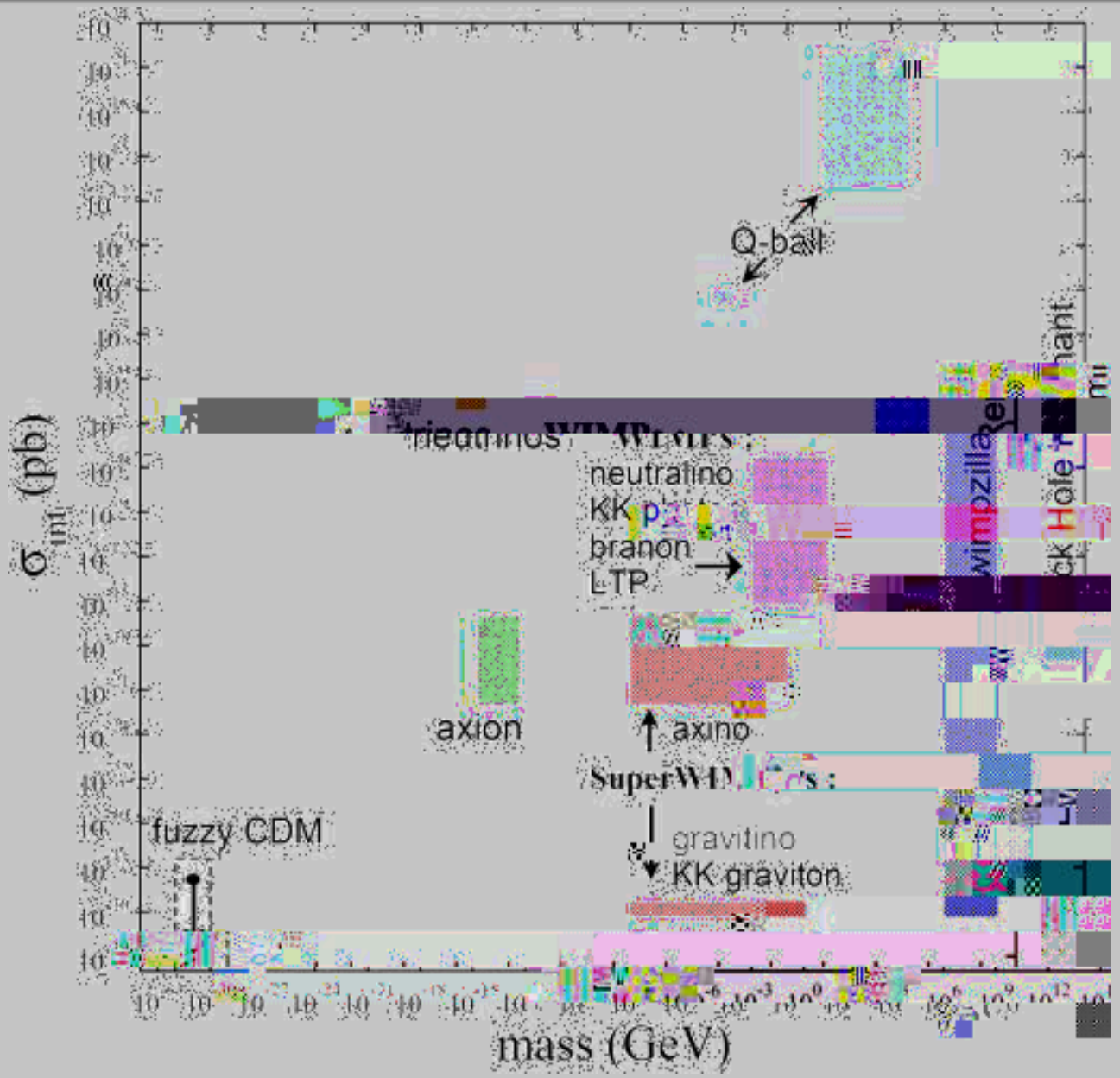
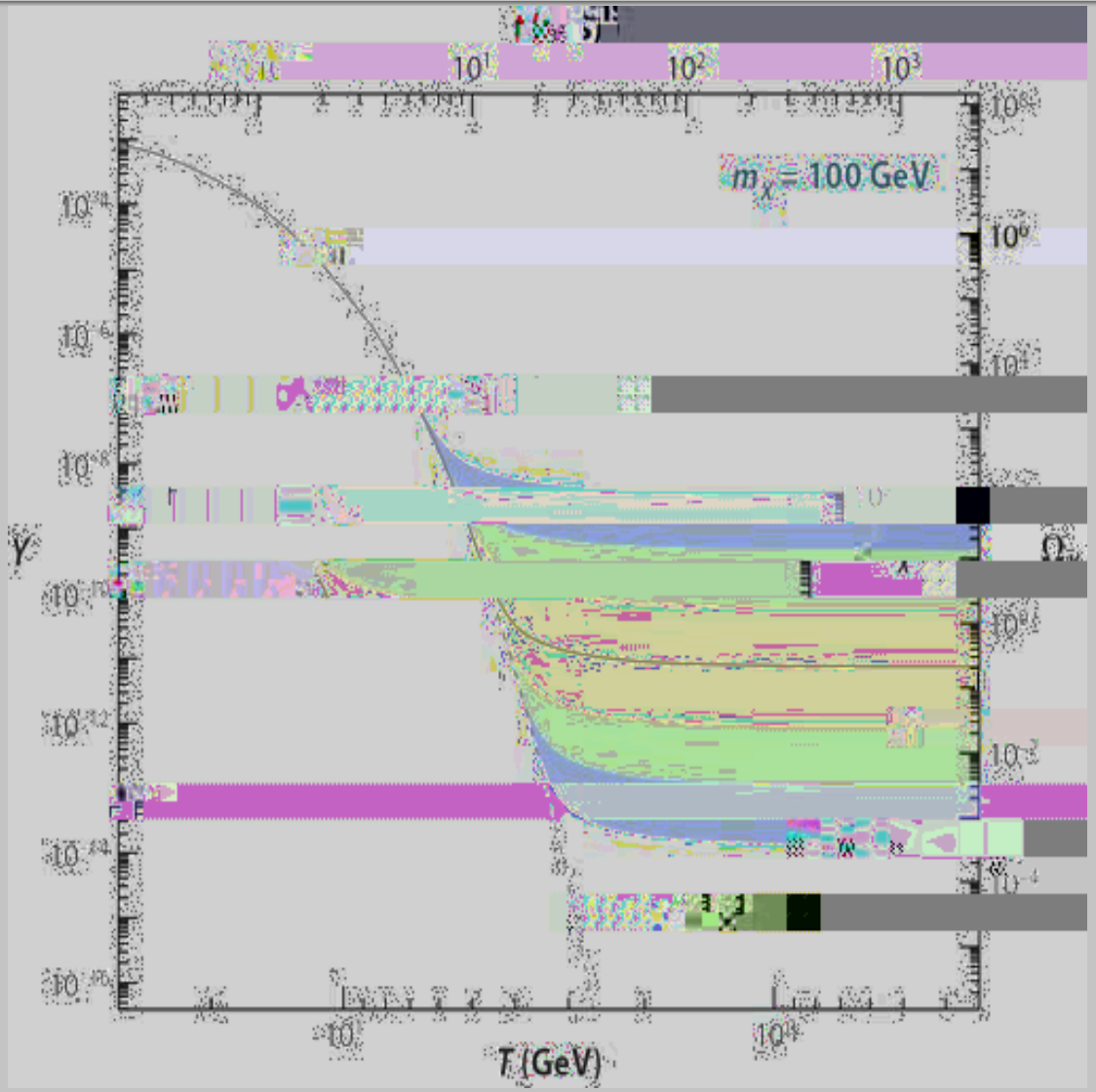
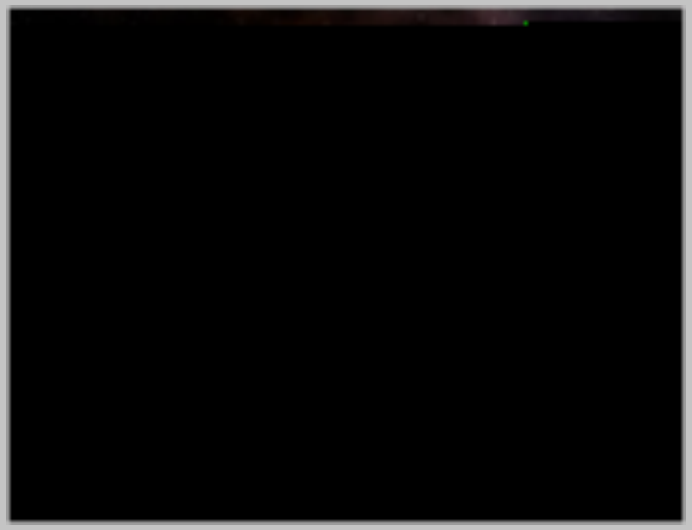
a a

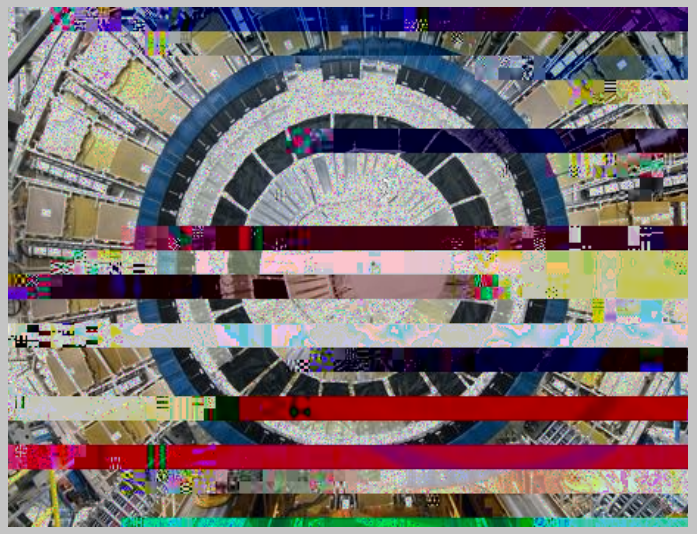

Q-ball
neutralino
KK p
branon
LTP
axion
axino
SuperWD
gravitino
KK graviton
fuzzy CDM
mass (GeV)

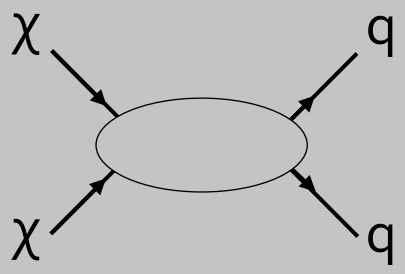
The WIMP Miracle

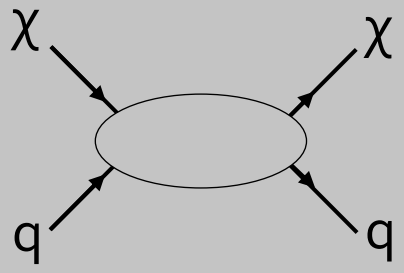


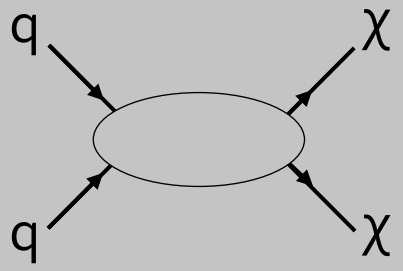
Searching for Dark Matter



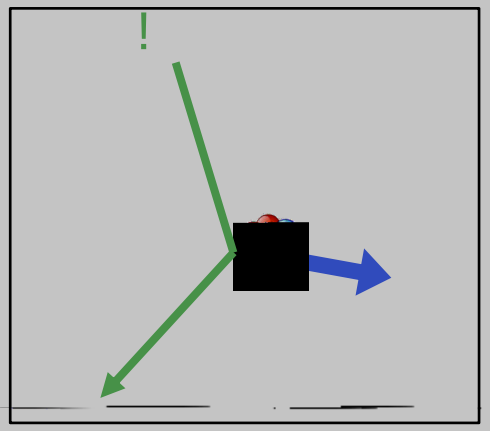








- E3780#47(/#9 7**3(#D7(*).632#
.7"#2.7**3(#3672*).7660#;(:9#
"1.63)F#)"41.)"<#6:-#3"3(<0#
"1.637(#(3.:)62#
  - We are looking for very low energy (~ 100 keV) nuclear recoils
- >1((3"*#3=D3()93"*2#7(3#
237(.5)"<#;:(#7*#*53#63836#:;#
G$#)"*3(7.*):"H*:""3HO(



- La a
- L
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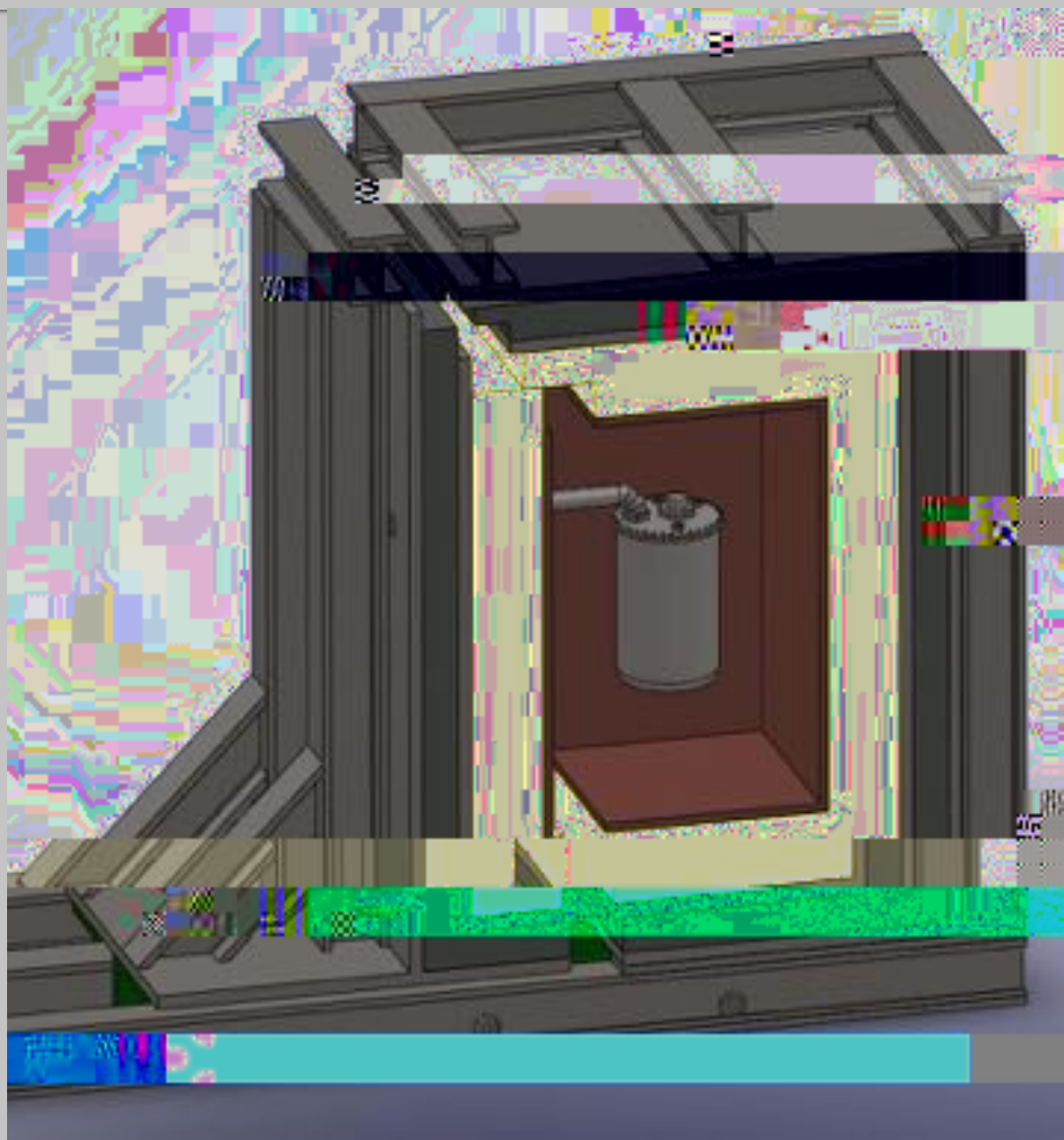
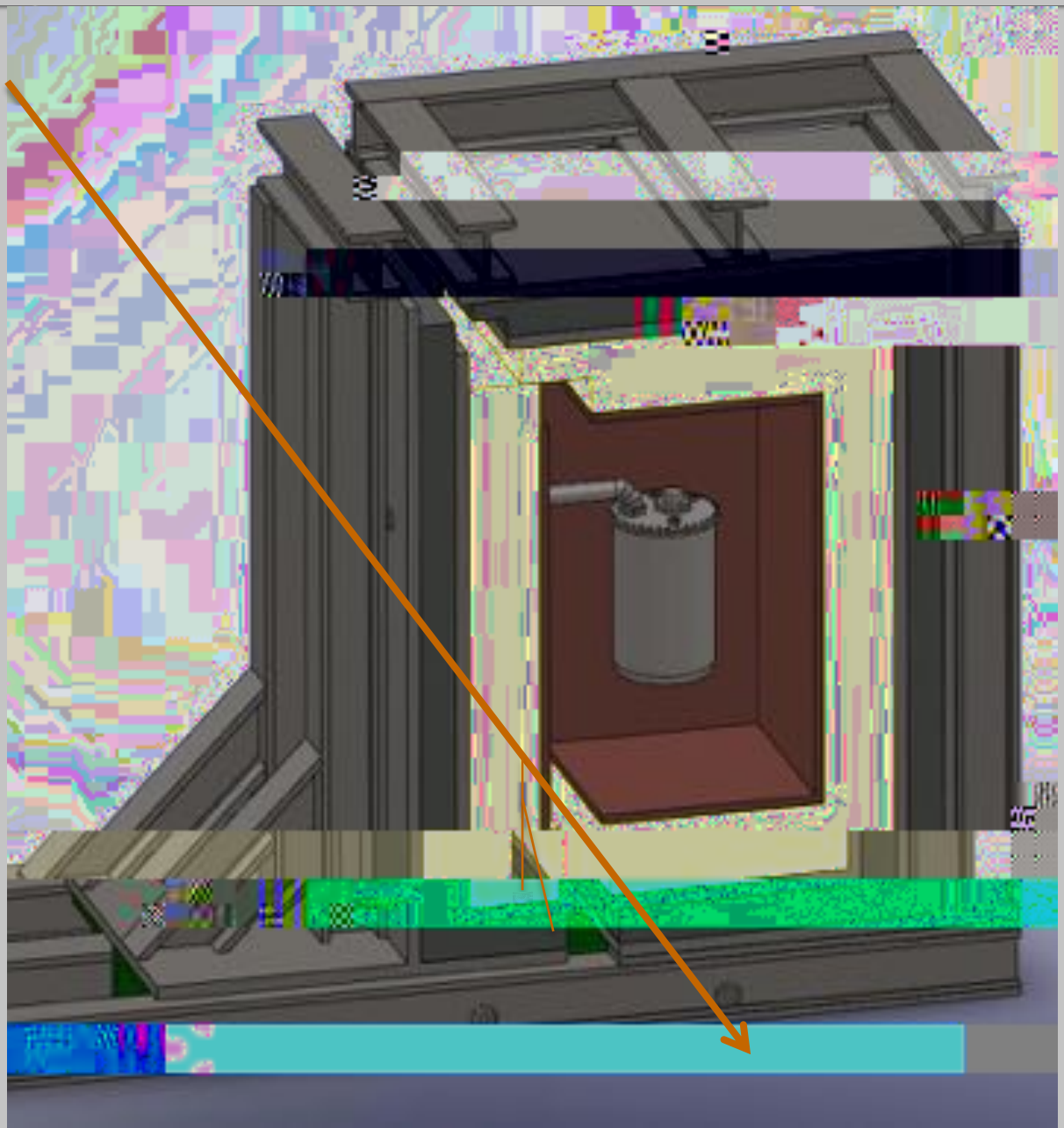
  c a





!"#$%"&'()&*+,&-#+.+#/

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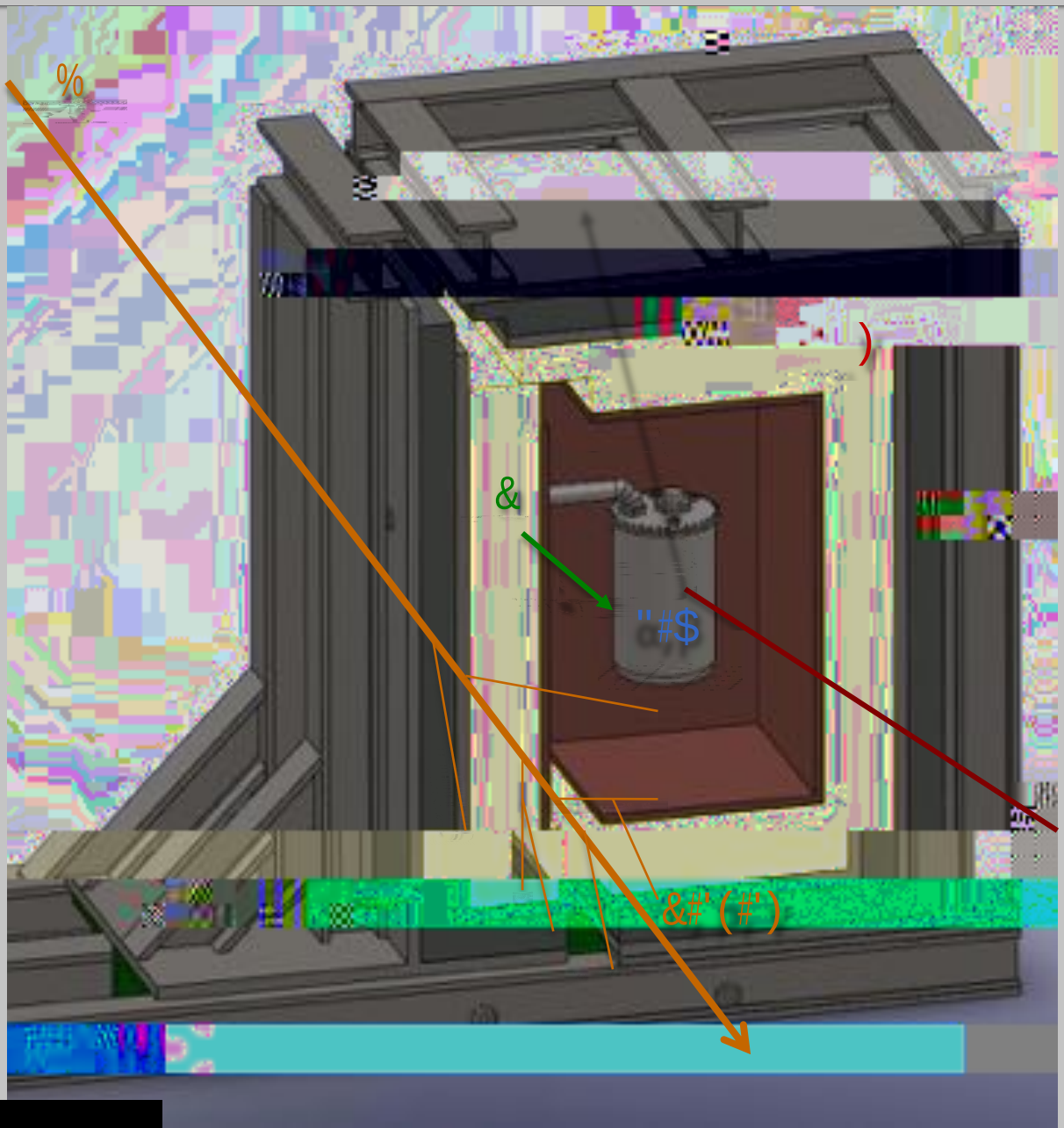
$8#$%"&'(&"*(9%, 6(

73+$'*+":



!"#$%"&'()&*+,&-#+.+#/

² 01(² ²231($#-4

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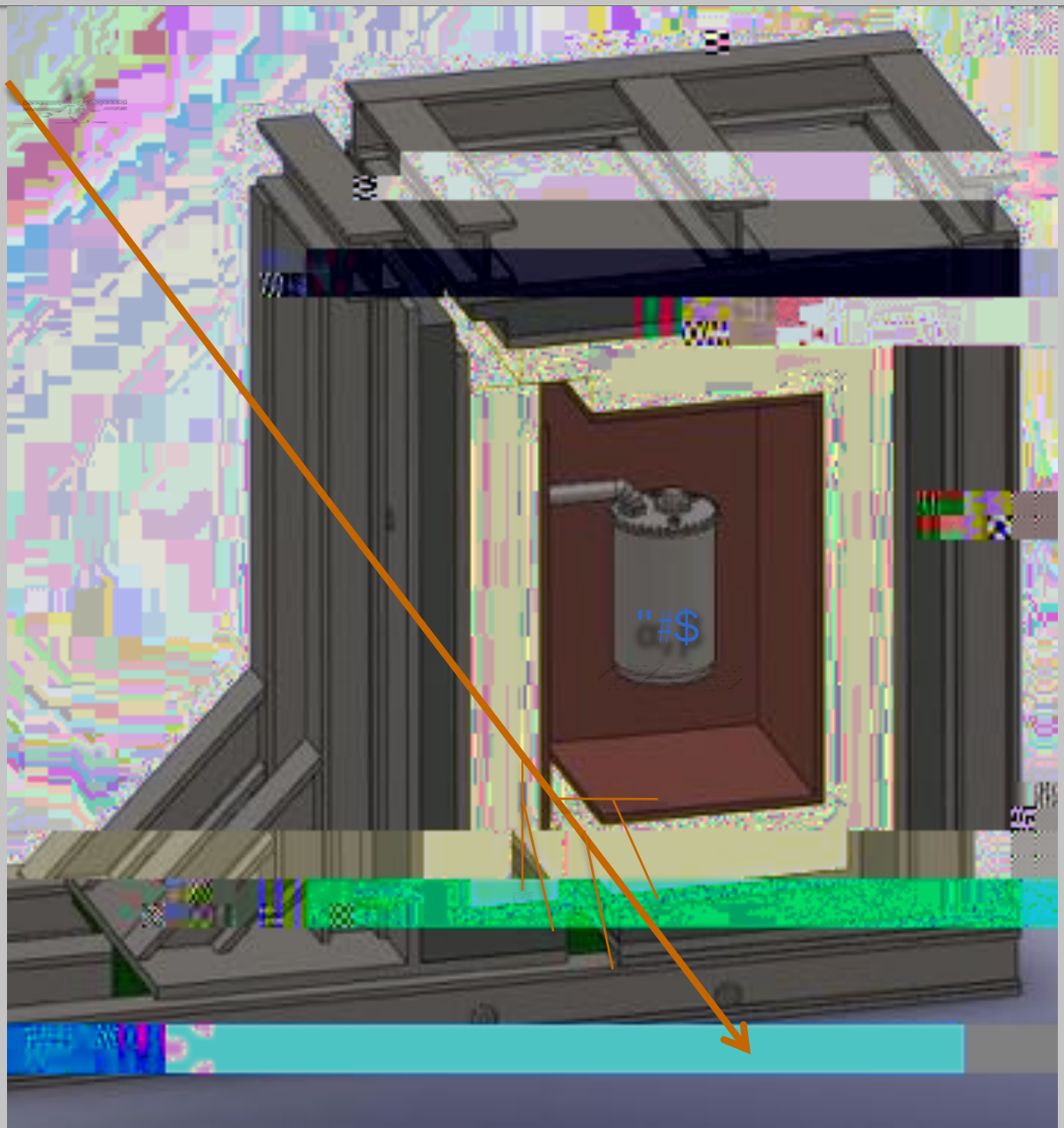
73+$'*+":



!"#$%"&'()&*+,&-#+.+#/
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5&6 6&()&/7(
$8#$%"&'(&"*(9%, 6(
73+$'*+":
)&*+, :$"+-(;$<#%, "7
9%, 6(7=, "#&"$,<7(
9+77+, "(&"*(>?1"@1(
$8#$%"&''/(&"*(+"(
73+$'*+":(
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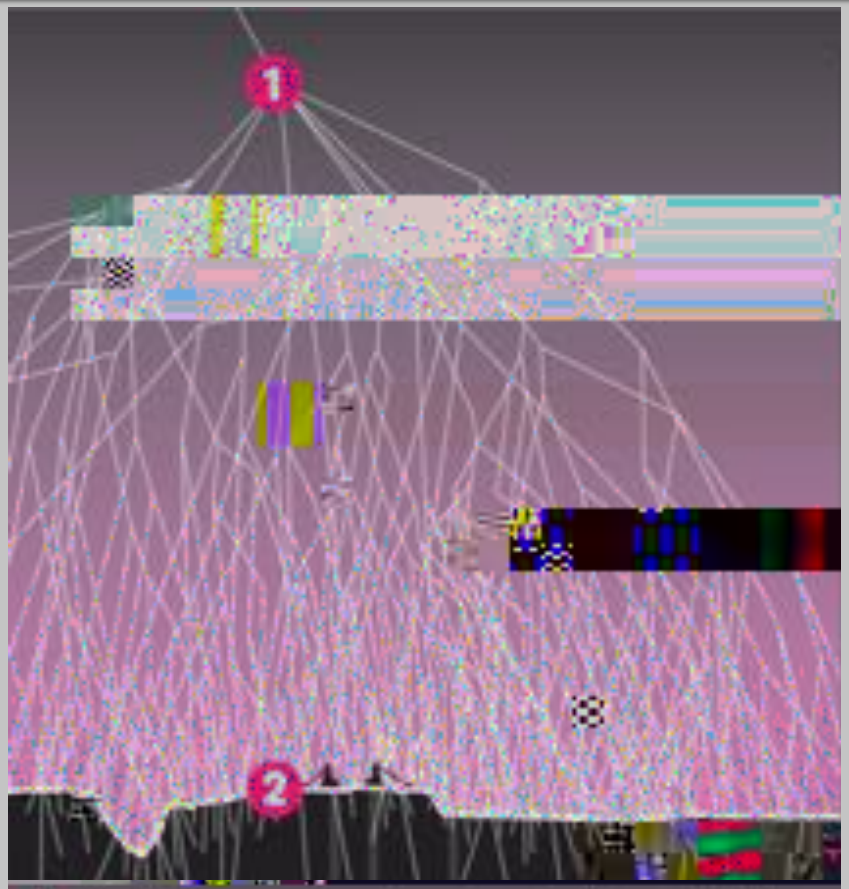

1 The Earth's upper atmosphere is constantly bombarded by cosmic rays: high-energy particles—mostly protons—that originate in outer space. When these particles collide with atoms in the upper atmosphere, they spawn particle

2 Dirt and rock stop most of these particles within a short distance. But muons often have enough energy to penetrate the earth for hundreds of feet or more. At the surface, cosmic-ray muons pass through your hand at a rate of more than one per second.

!"#$%"&'()&*+,&-#+.+#/
² 01(² ²231($#-4
5&6 6&()&/7(
$8#$%"&'(&"*(9%, 6(
73+$'*+":
)&*+, :$"+-(;$<#%,"7
9%, 6(7=,"#&"$,<7(
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73+$'*+":(
A,76+-(B<,"7
C&7#(;$<#%,"7(
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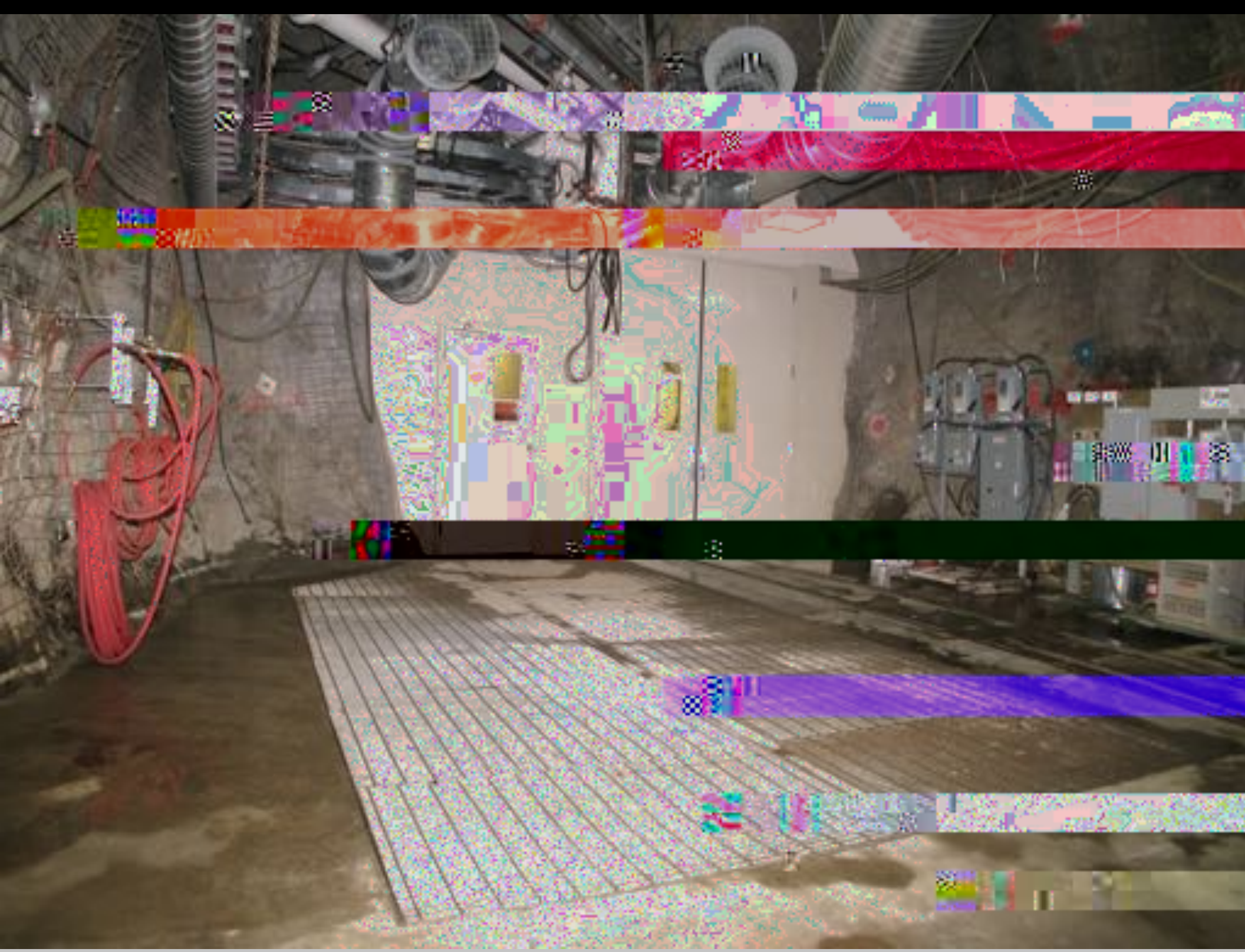
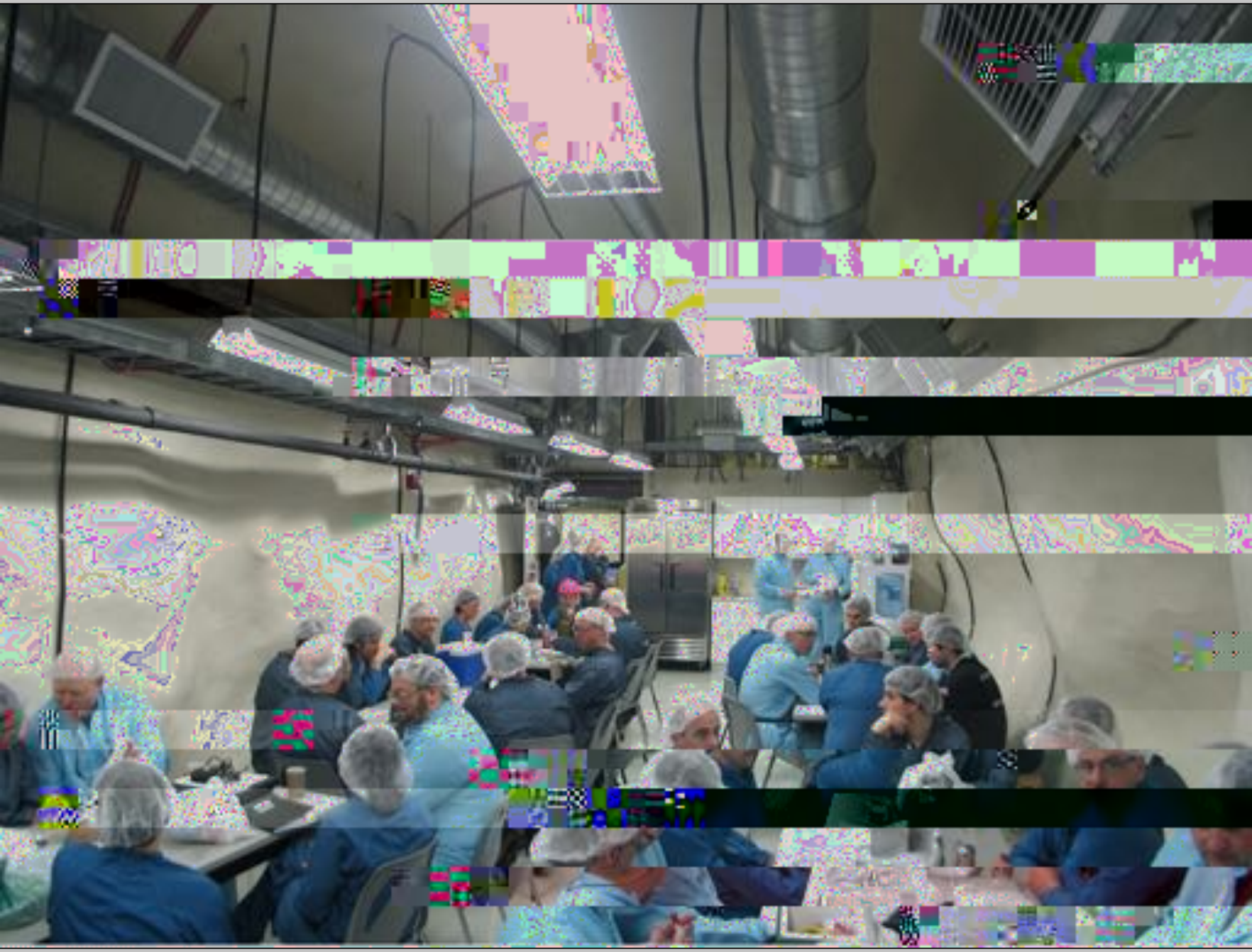
SNOLAB
Mining for knowledge



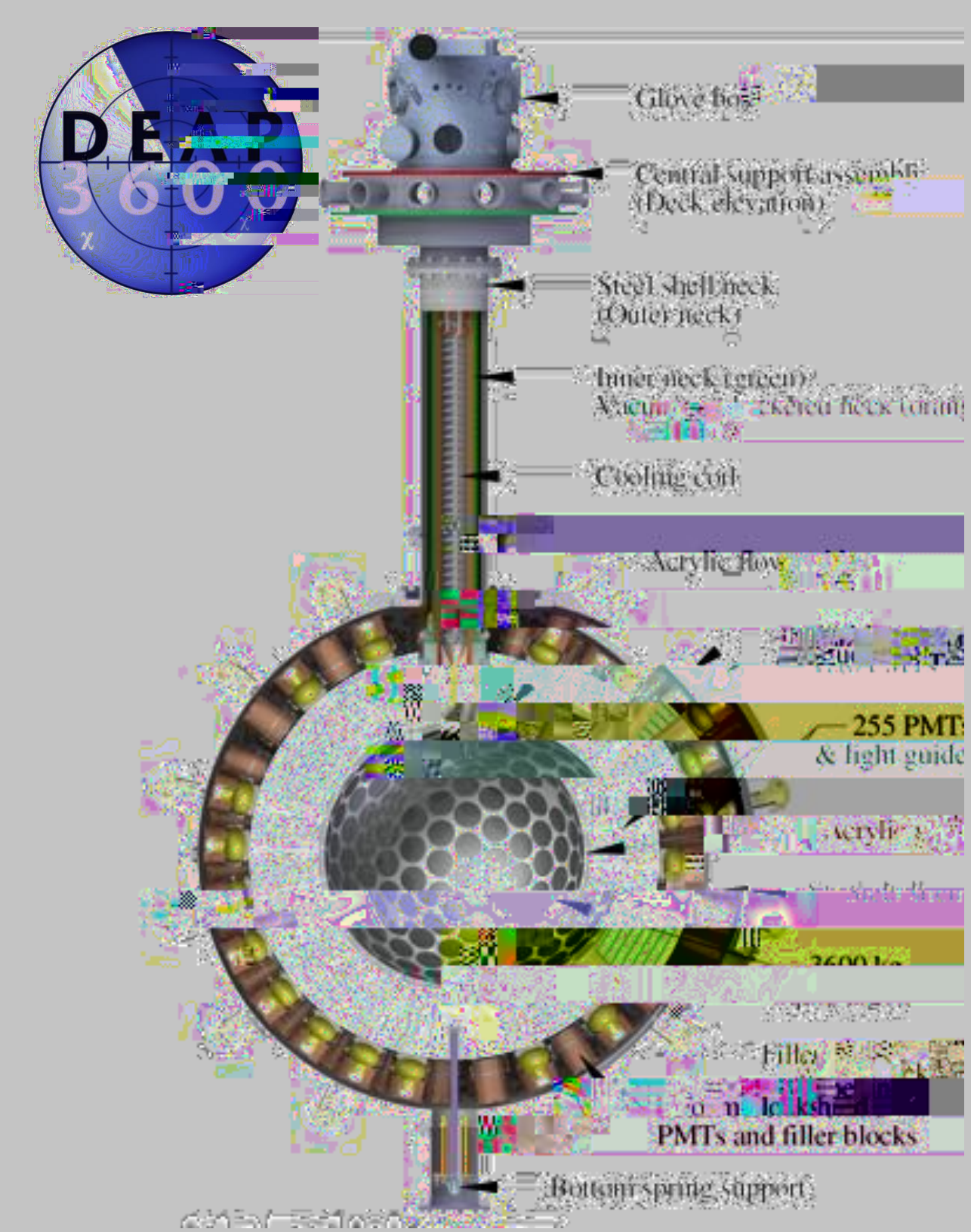
SNOLAB
Mining for knowledge

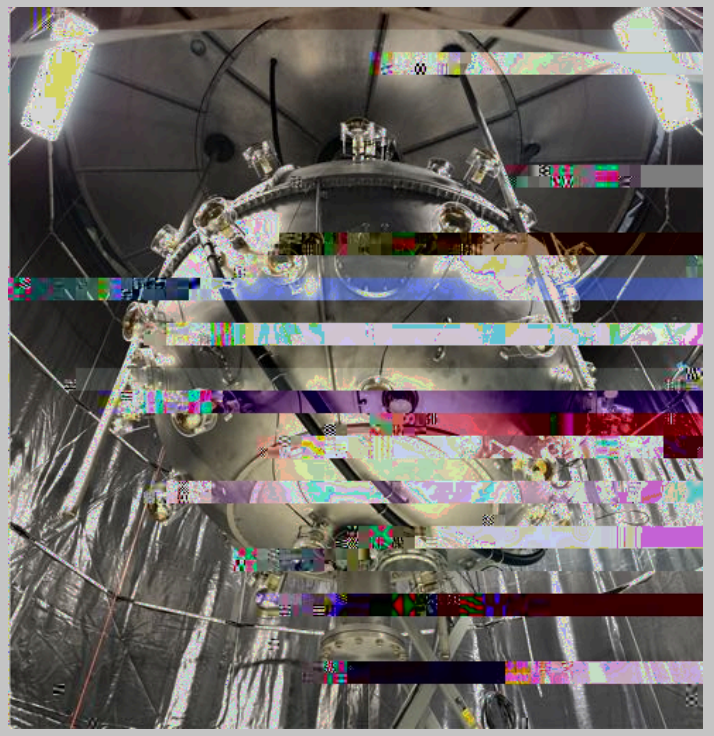


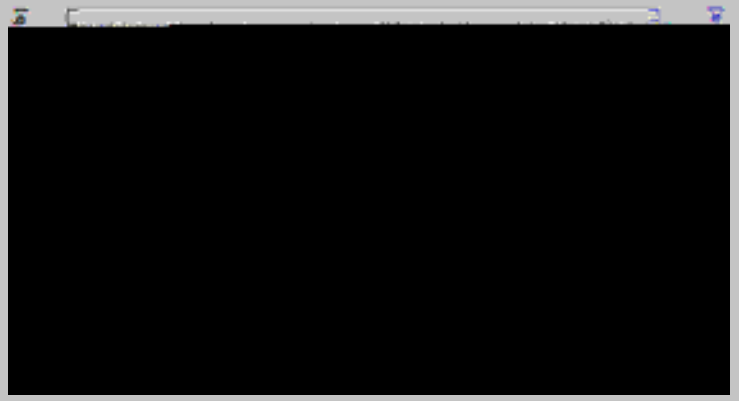
DEAP
3600

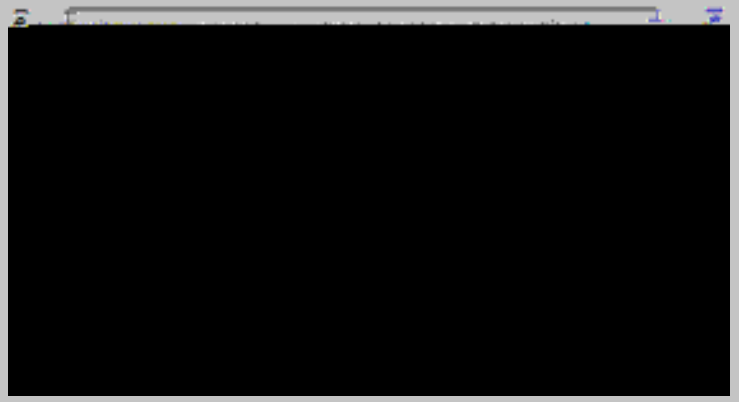
Vow

Pitt


DEAP
3600
Glove box
Central support assembly
(Deck elevation)
Steel shell neck
(Outer neck)
Cooling coil
Acrylic flow
255 PMTs
& light guide
Filler
PMTs and filler blocks
Bottom spring support







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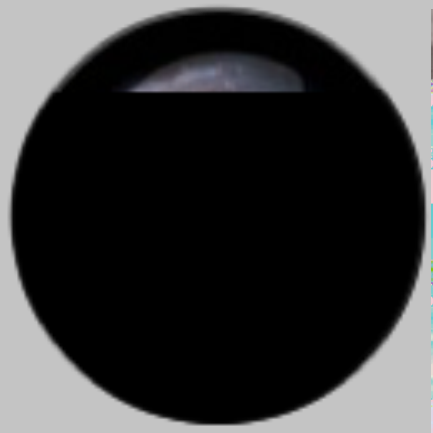
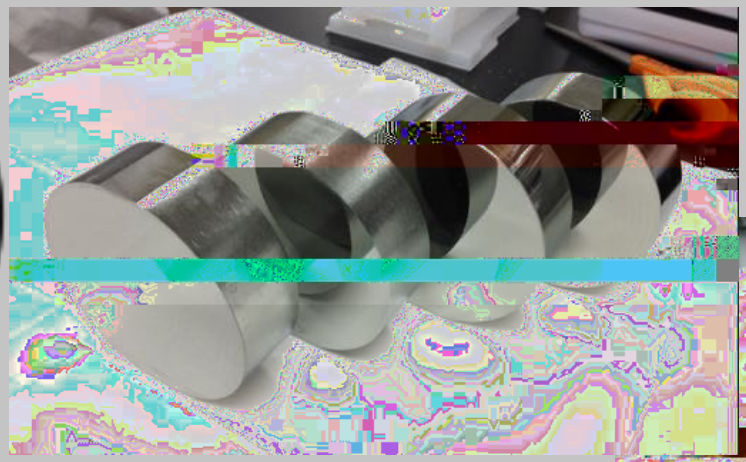
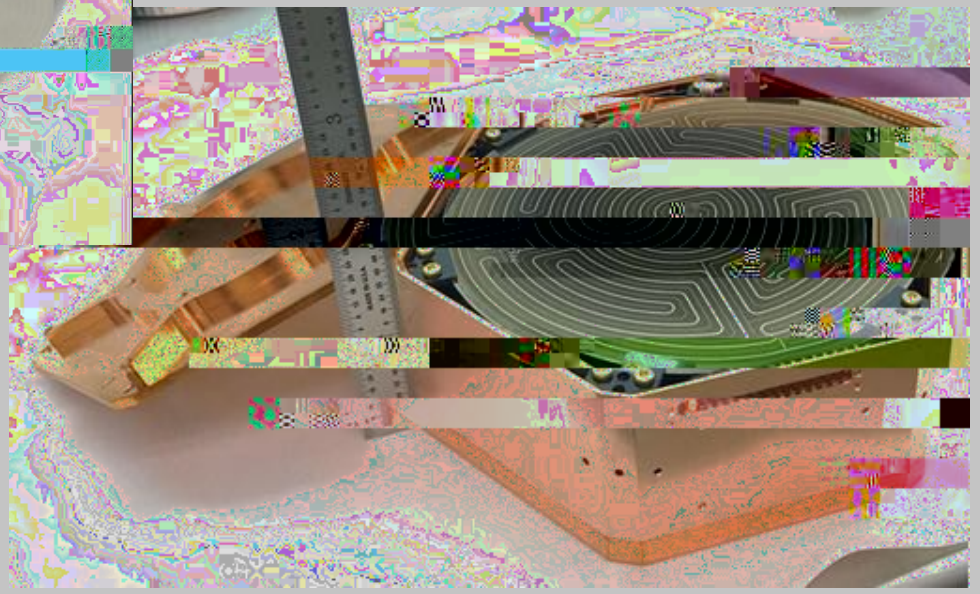
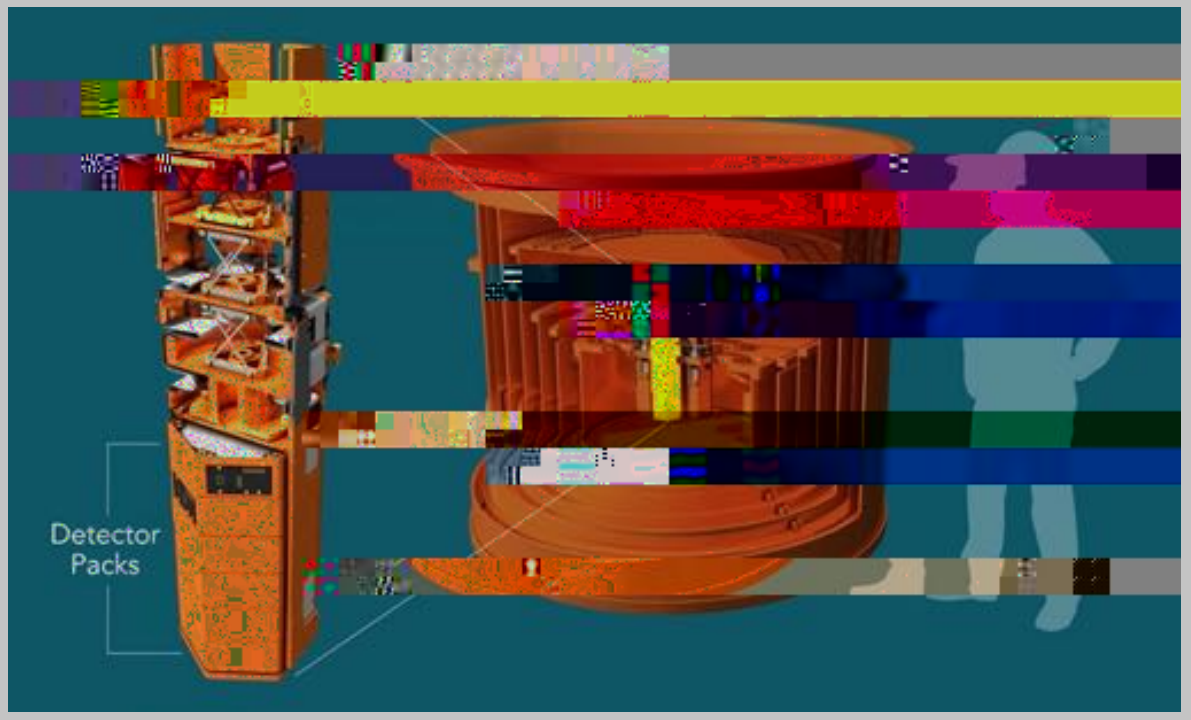
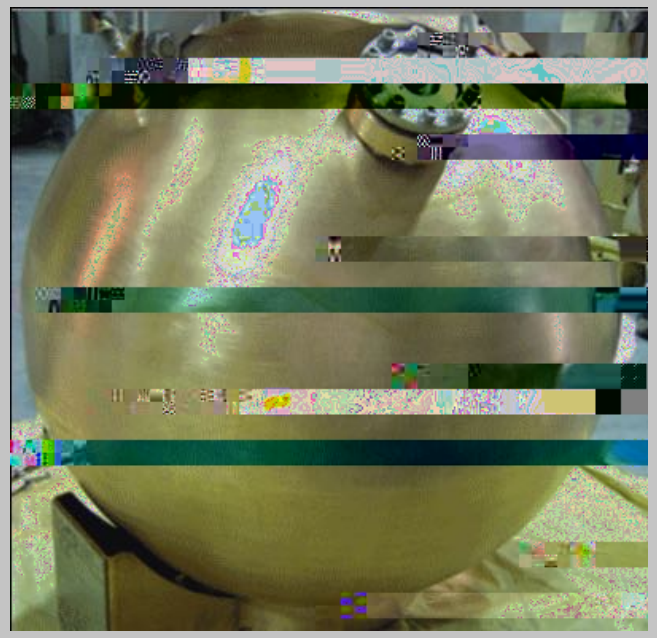
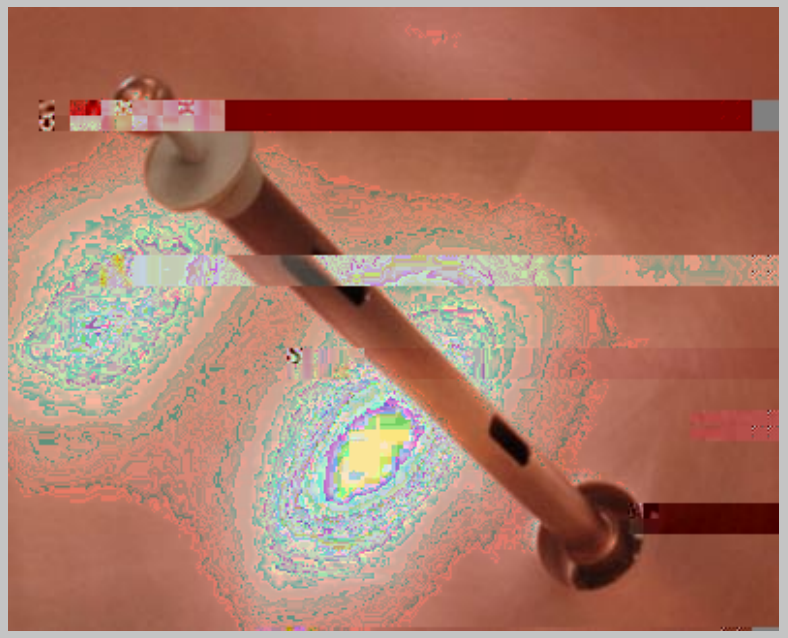


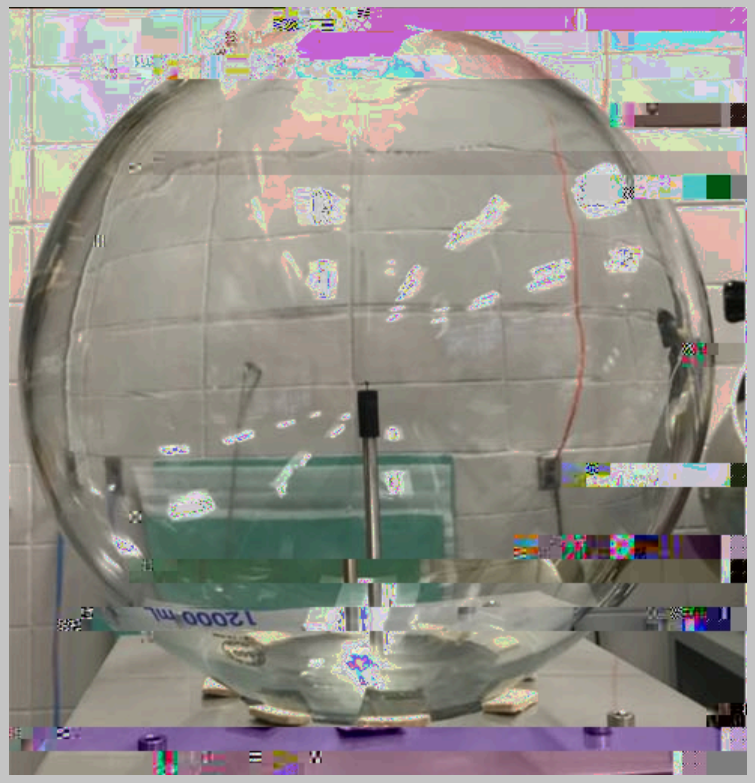


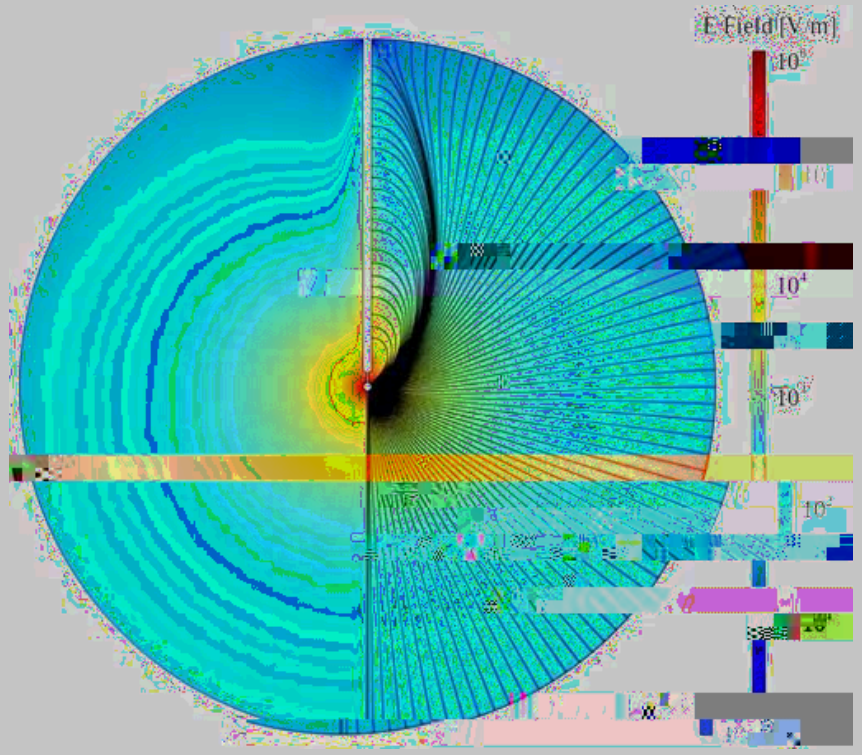


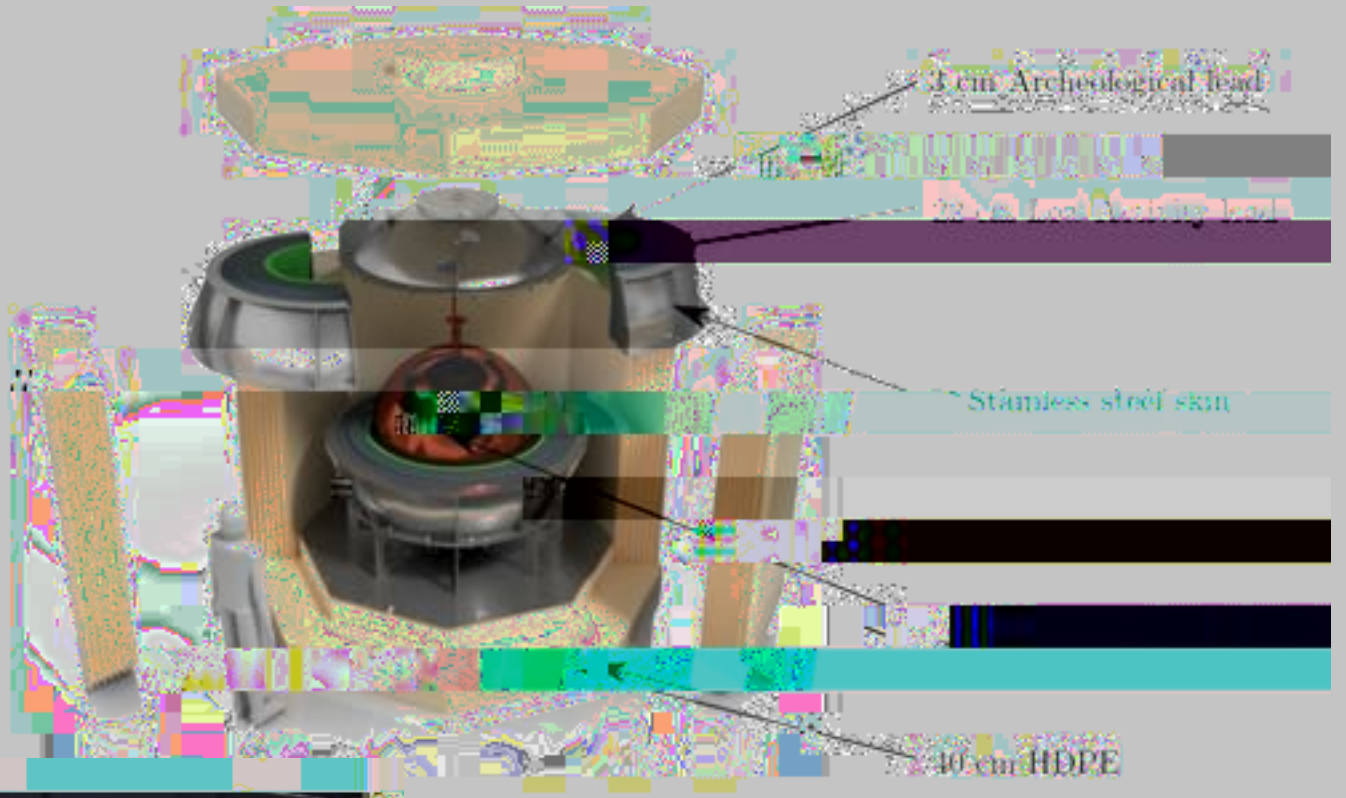

Detector
Packs

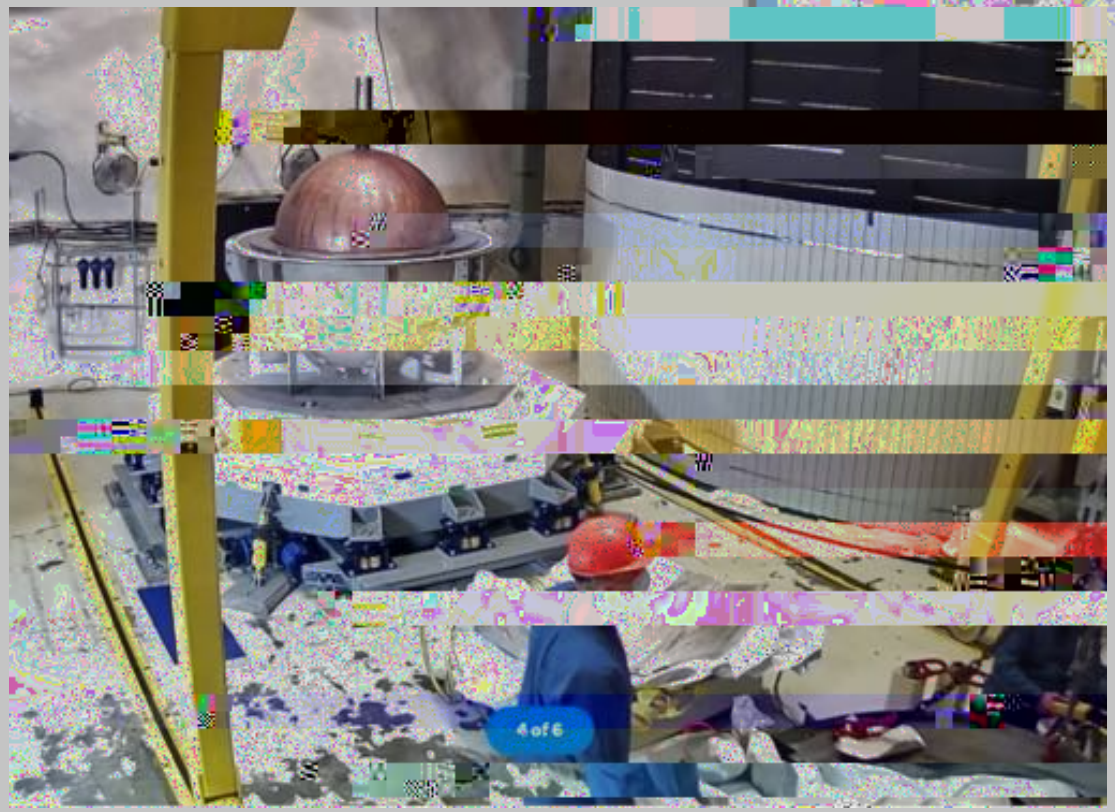




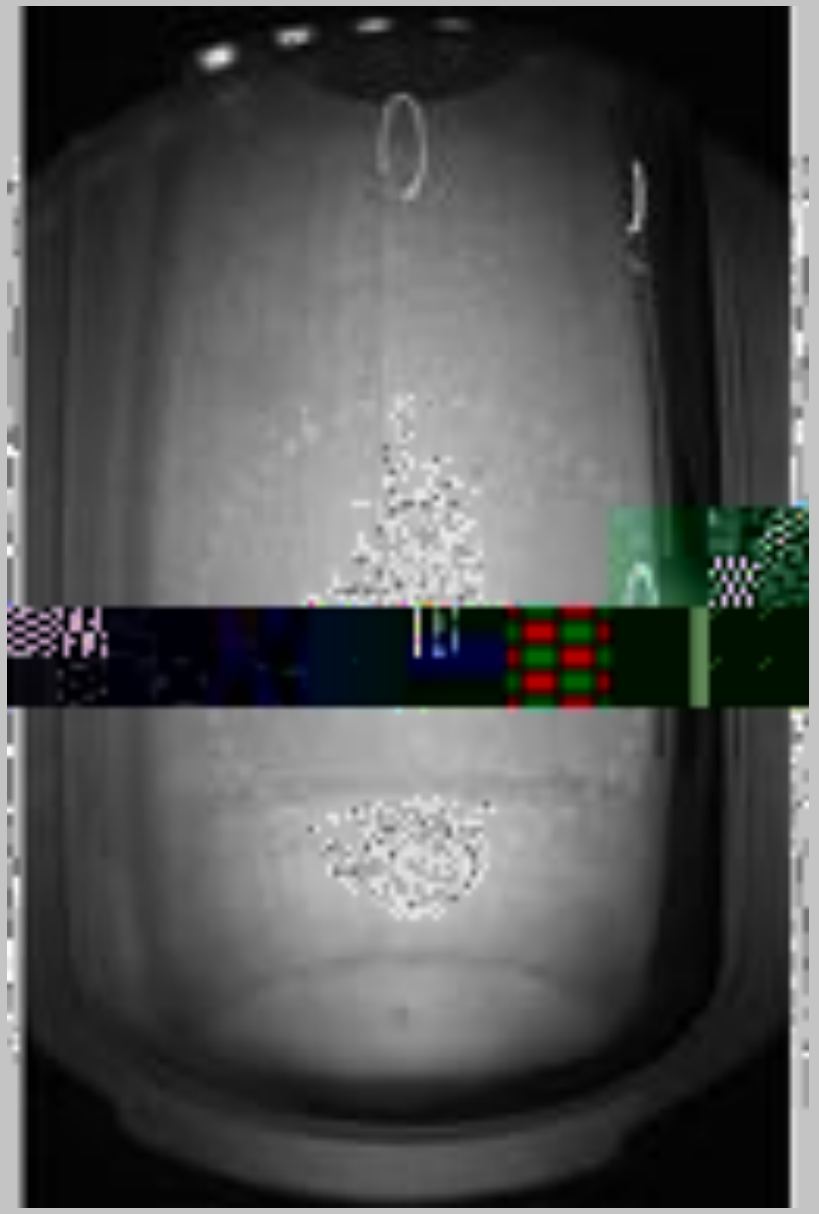


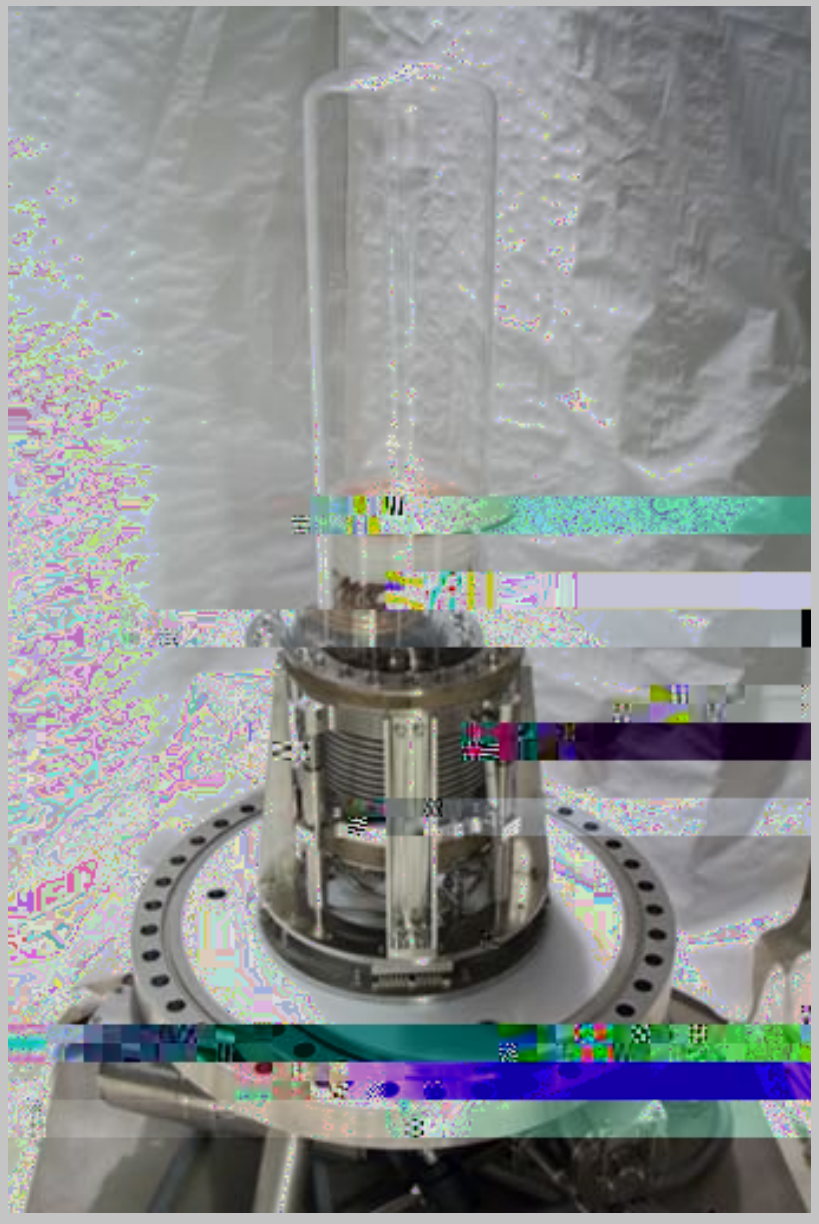

E-Field [V/m]
10^5
10^4
10^3

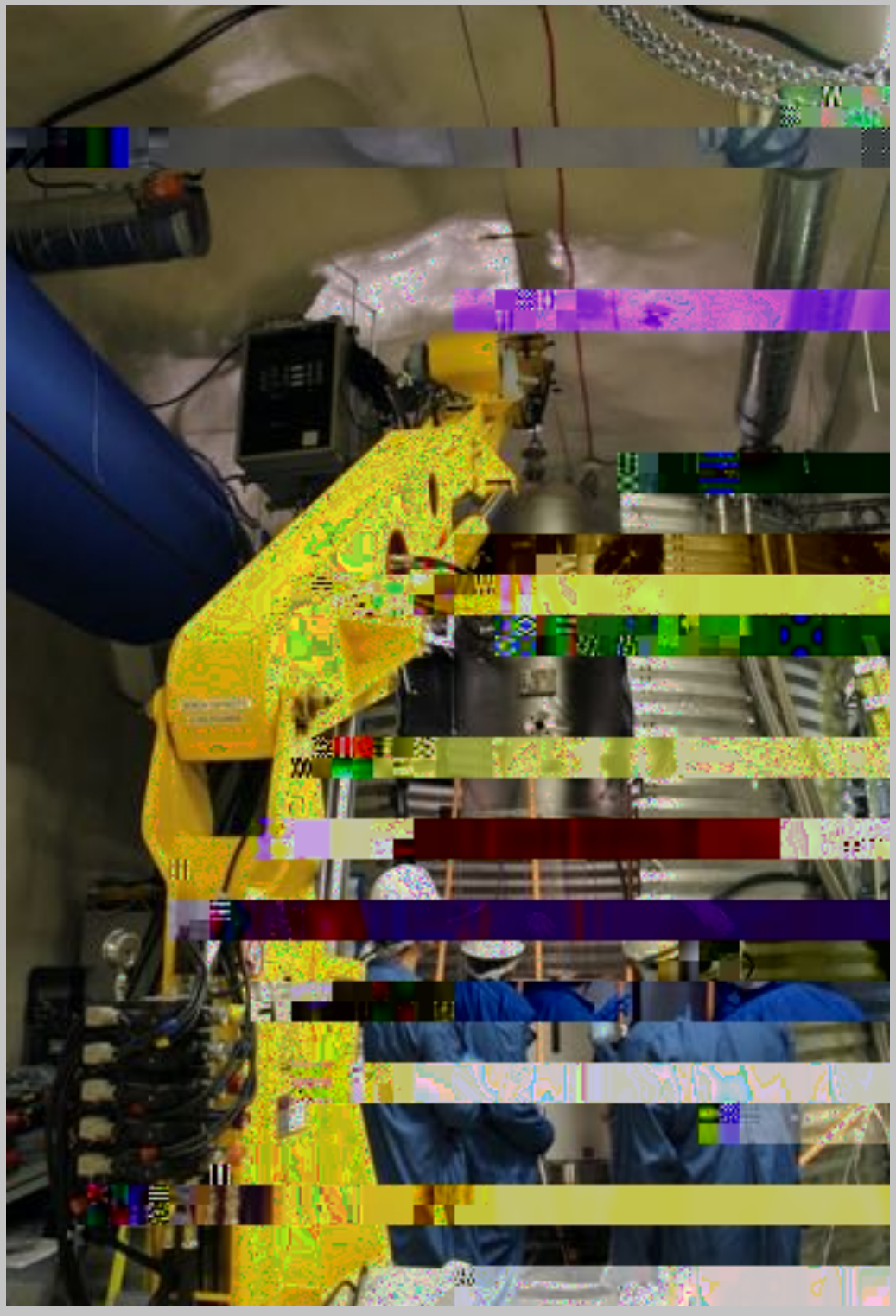

3 cm Archeological lead
Stainless steel skin
40 cm HDPE


4 of 6

Top Instrumentation Fla
Cameras
Piezo Electric
Transducers
Heating Plate
Cooling Coil
Bellows
F8 Lines







- Da Ma a
- A c a a
  c a ca
  ab a
- Ca a a SNOLAB a b
  a a a a c