

2.'%-*

! "#\$%#&' ()"*+ , , -)*" .) / "0\$((&%1)
2.' %-&#)3&14#)56.7\$-

869\$.7&-" .-:);<%1") = ' (0 / ' %%)
))))))))))) ; > ' % ; ! \$ # \$.) ? 6 ((\$.)
))))))) ;) @ % 1 \$ (" -) 2 - & ' . ' -

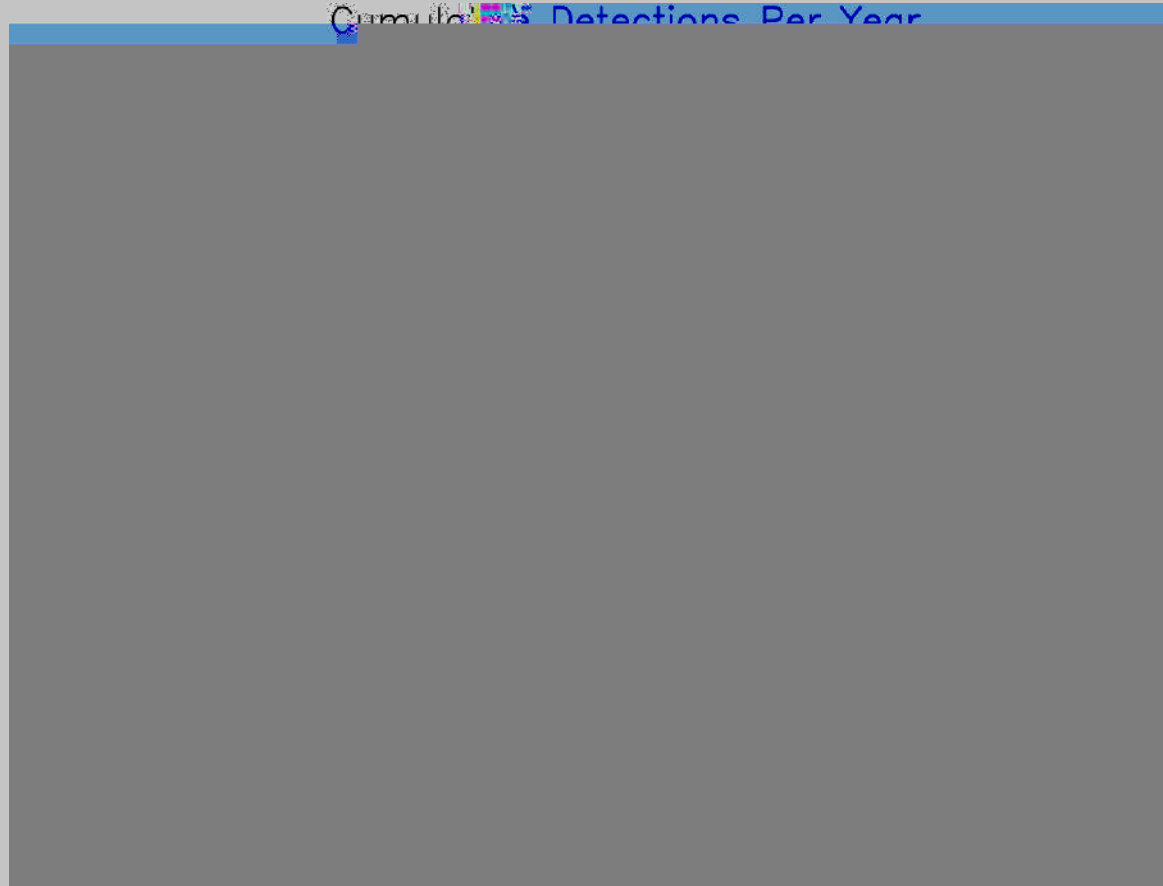
? ". \$) B" (' C" . ' # " . - :) , & D" (' " -) , & D" (' " 6 E) F & ((G) H O I ' . O - E) J " . O " %) K & 9 E) L 6 \$ % # & %) 5 4 ' % 1 \$ ' # E) J & " 7 ' % % ') 2 & % \$ # &

Exoplanets Boom

- In our galaxy: \approx 15' --' %)\$#)' (V)NOAAW

Exoplanets Boom

- In our galaxy: ≈ 100 billion
- HX9"%"\$%#&' ()O&-B"7\$.G).' #\$.Y



Exoplanets Boom

- In our galaxy:

≈

U5' --' %)\$#)' (V)NOAAW

- HX9''%\$%#&' ()O&-B''7\$.G).' # \$Y

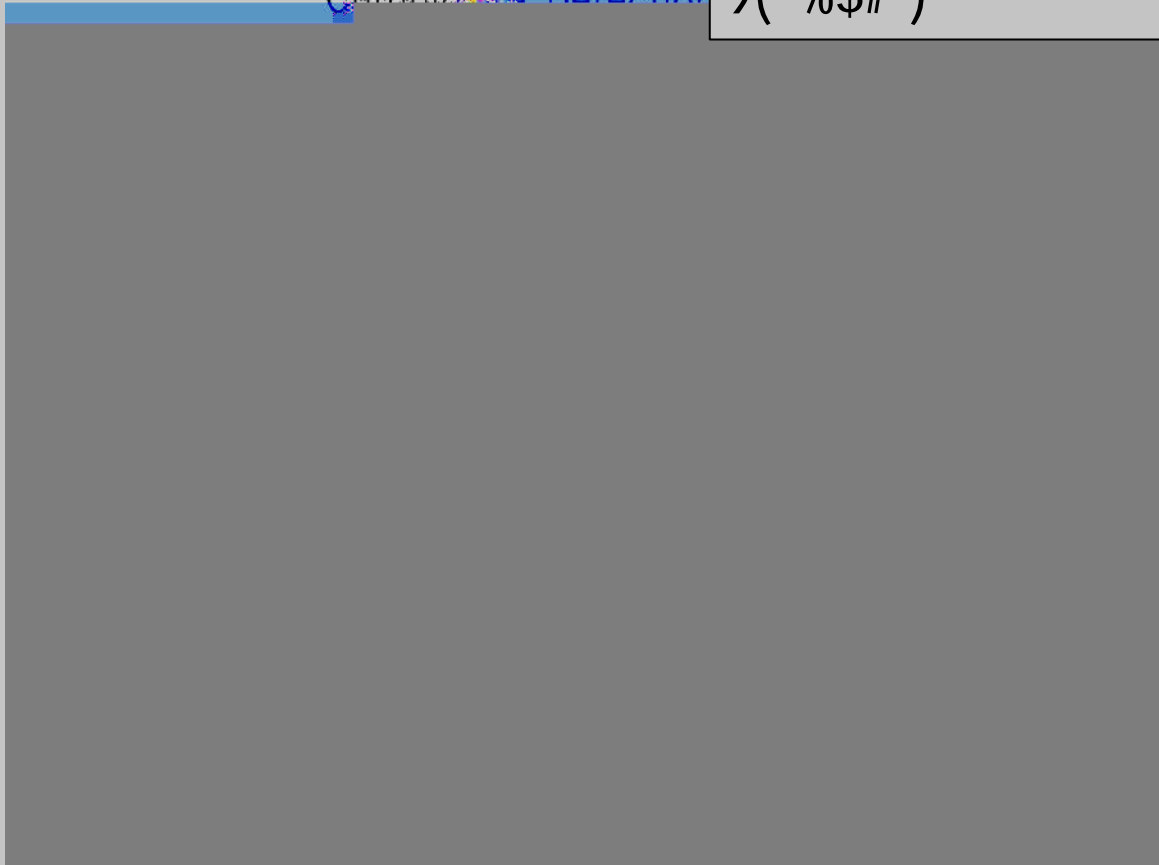
, R#S)Q), 0VN#Z[]))!

A00)G\$' .-

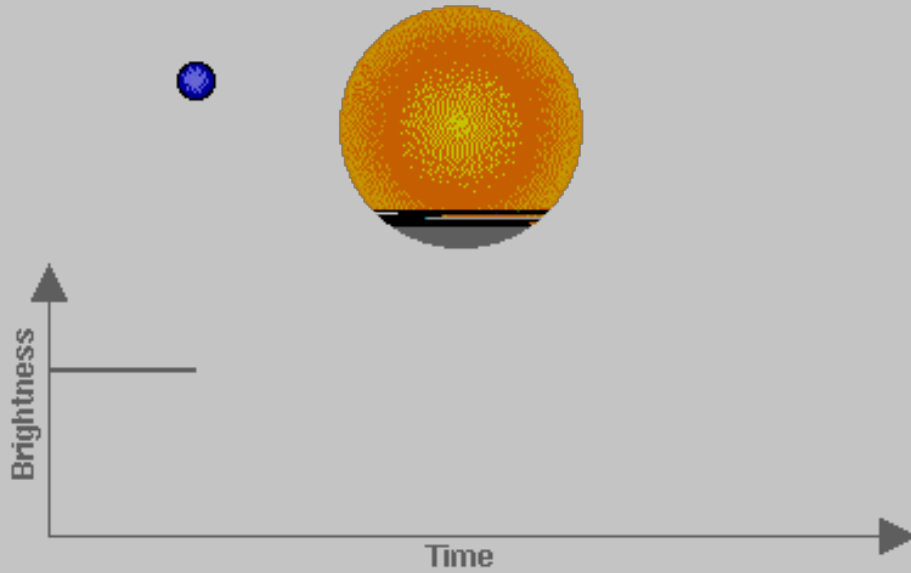
#''O&-B''7\$.)' (())? &(DG)I ' G)

9(' %\$#-)

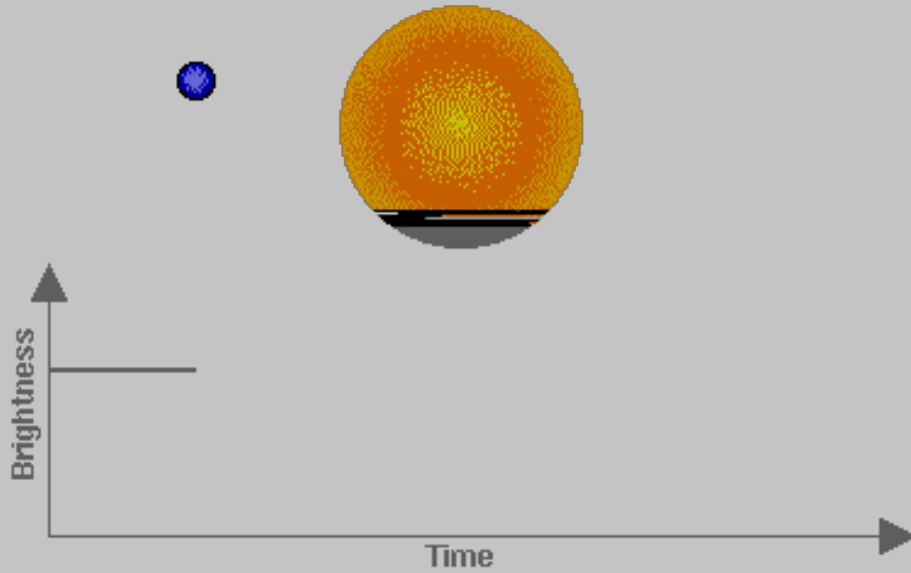
Cumulative Detection



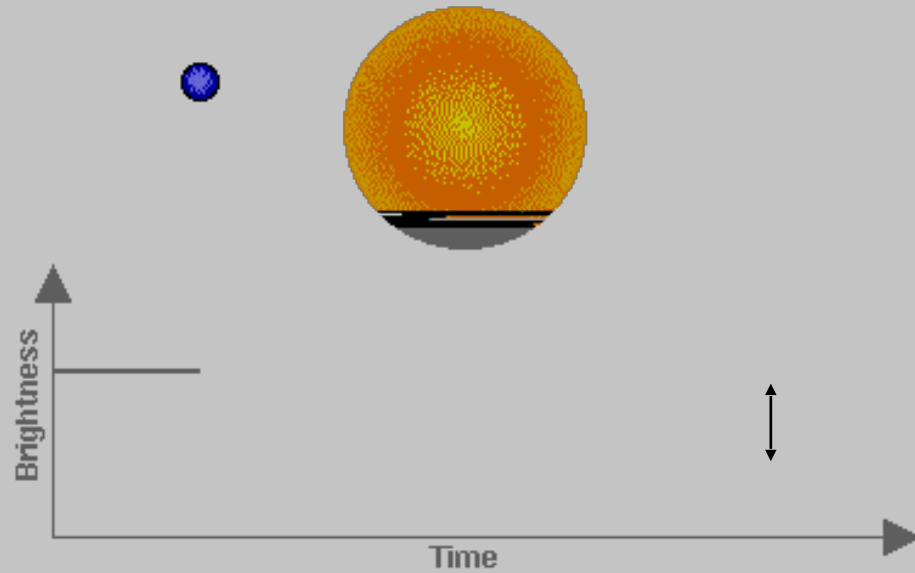
Transit method



Transit method

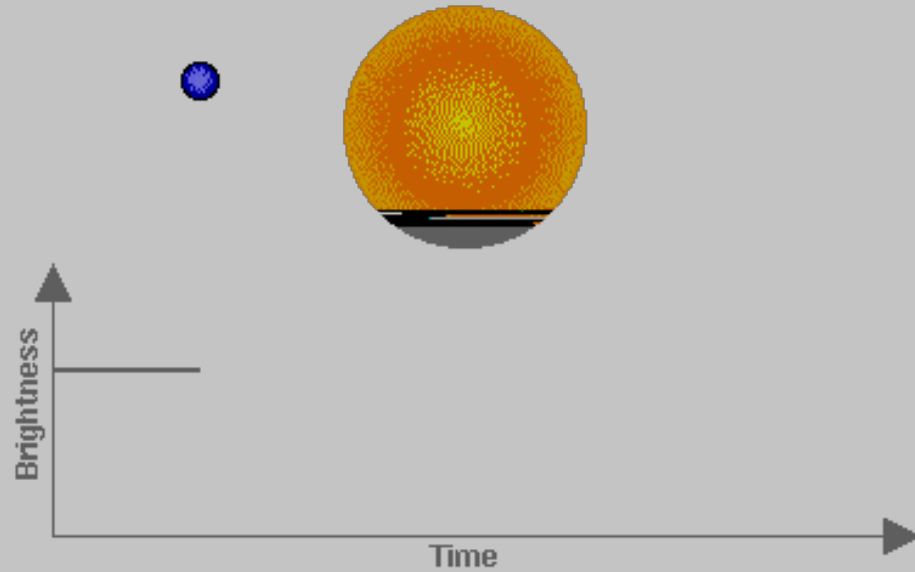


Transit method



$$F \simeq (1 - \delta) F_{star}$$

Transit method



$$F \simeq (1 - \delta) F_{star}$$

What's the problem?

- 3" I)8, +:)-#' .-)'. \$)/ 6B4)C&11\$.)#4' %)9(' %\$#-)
- 5" / 9(\$X)! 4G-&B-:)(&/ C;O' .D\$%&%1E)94' -\$;B6.7\$-E)/ 6(#&;9(' %\$#-__)
- `'.&' C(\$)-#' .-:)89"#-E)*(' .\$.-__))
- <%-#.6 / \$%#)-G-#\$ / ' #&B-:).' / 9-E)a###\$.E)C6 / 9-__

What's the problem?

- 3" I)8, +:)-#' .-)' .\$/ 6B4)C&11\$.)#4' %)9(' %\$#-)
- 5" / 9(\$X)! 4G-&B-:)(&/ C;O' .D\$%&%1E)94' -\$;B6.7\$-E) / 6(#&;9(' %\$#-__)
-

Transits observation



Data Volumes

- Large amount of unprocessed data

Space Missions	Data Volume [GB/day]
Kepler	1.10
Spitzer	~1-6
Hubble	3
Tess	27.21
JWST	

From one transit LC...

- ! . \$B&-&"%)*&##&%1)"*)')94G-&B-)/"0\$()
- A' .G)2.' %-&#E)N' .G)#.' %-&#E)94' -\$)B6.7\$-E)#&/&%1__

)0\$#.\$%0\$0

UM' %1)\$#)' (V)NOAcW

From one transit LC...

- ! . \$B&-&"%)*&##&%1)"*)')94G-&B-)/"0\$()
- A' .G)2.' %-&#E)N' .G)#.' %-&#E)94' -\$)B6.7\$-E)#&/&%1__
- Detrending is necessary

)0\$#.\$%0\$0

- M\$#.\$%0\$0))
- ! 4G-&B' ()/"0\$()*&##\$0

UM' %1)\$#)' (V)NOAcW

...to many many LCs!

- Stellar LCs:

...to many many LCs!

- Stellar LCs:

i M58@i)d3ef

2<? H

↔ N^)0' G-

...to many many LCs!

- Stellar LCs:



i M58@i)d3ef

2<? H

↔ N^)0' G-

...to many many LCs!

- Stellar LCs:

-
-

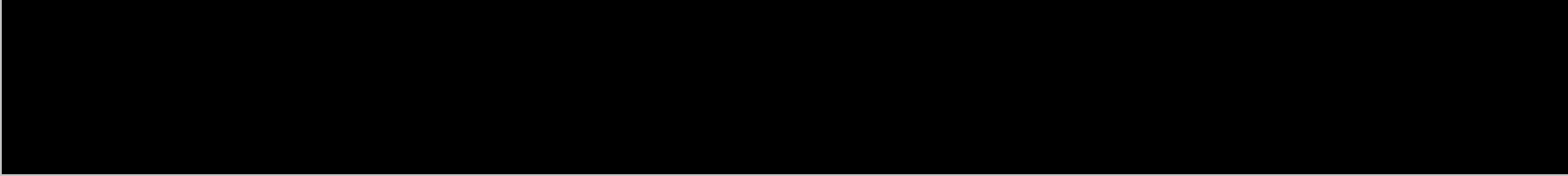
i M58@i)d3ef

2<? H

↔ N^)0' G-

...to many many LCs!

- Stellar LCs:
 -
 -
 -



...to many many LCs!

- Stellar LCs:

-
-
-
-

- 2.' %-&#-)35-)

-
-

i M58@i)d3ef

2<? H

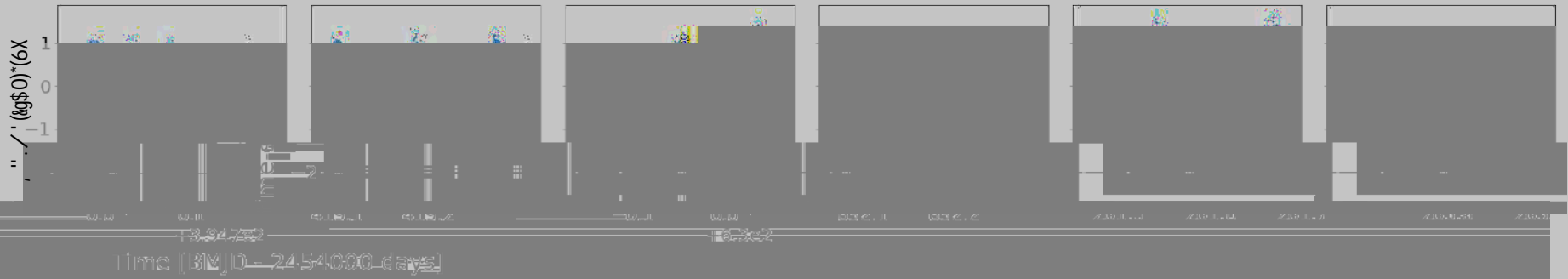
↔ N^)0' G-

M\$#. \$%0&%1)R')*\$ \$ I S)
89&#g\$.)3&1 4#)56.7\$-

The problem

M' #' :))

- b)"C-\$.7' #&""%-)"*)hM)AcP^TT)C)
- M\$#\$B#" .)Q)<+@5)c)

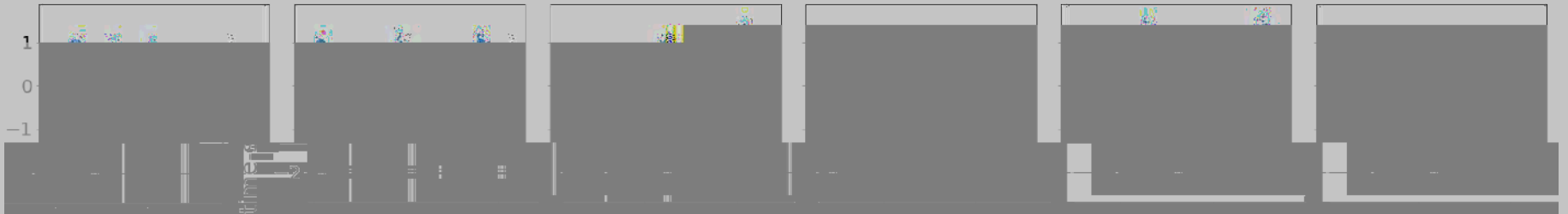




The problem

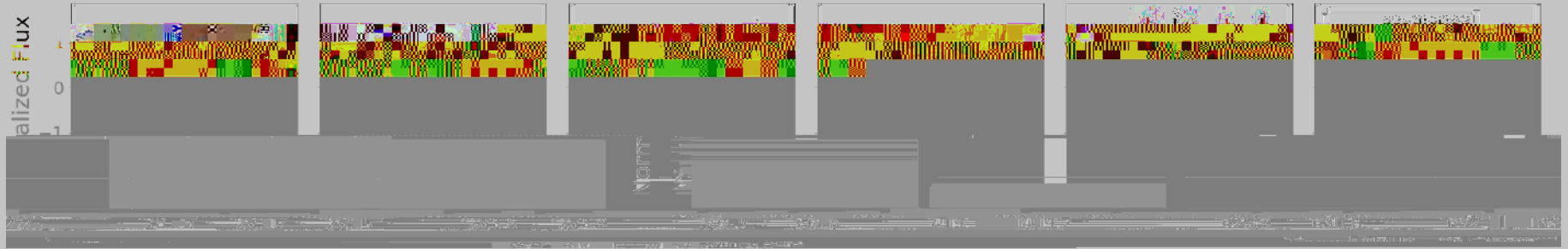
M' #' :))

-



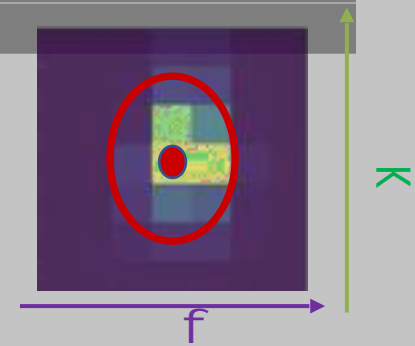
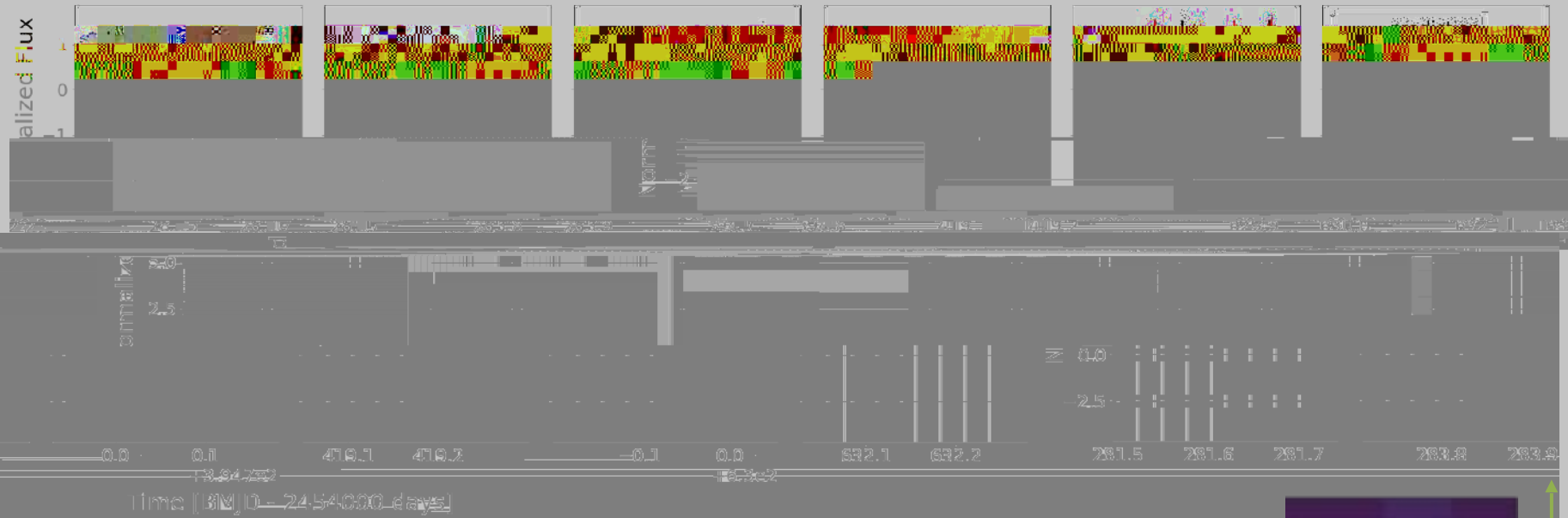
i 6.)' 99.'" B4:)&%#\$.9" (' #&'%"

5" ..\$B#&%1)89&#g\$.)
3&14#)56.7\$-



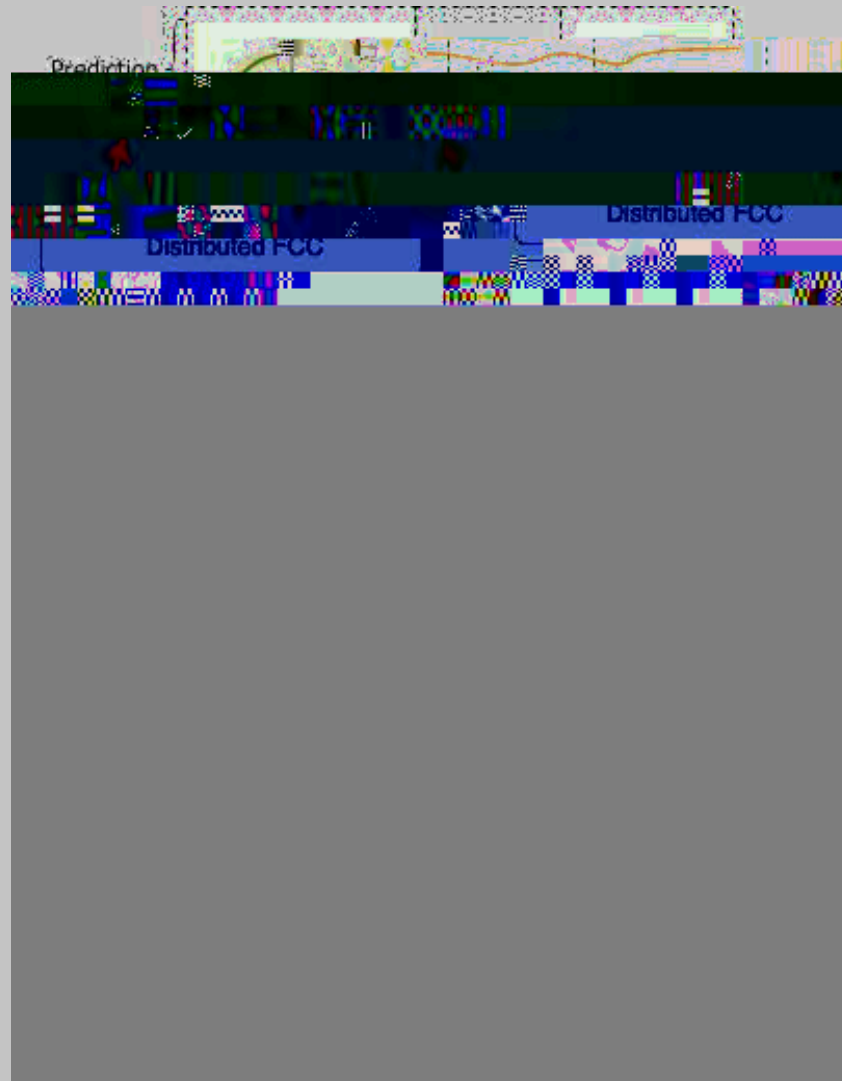
i 6.)' 99.'" B4:)&%#\$.9" (' #&'%"

5" ..\$B#&%1)89&#g\$.)
3&14#)56.7\$-



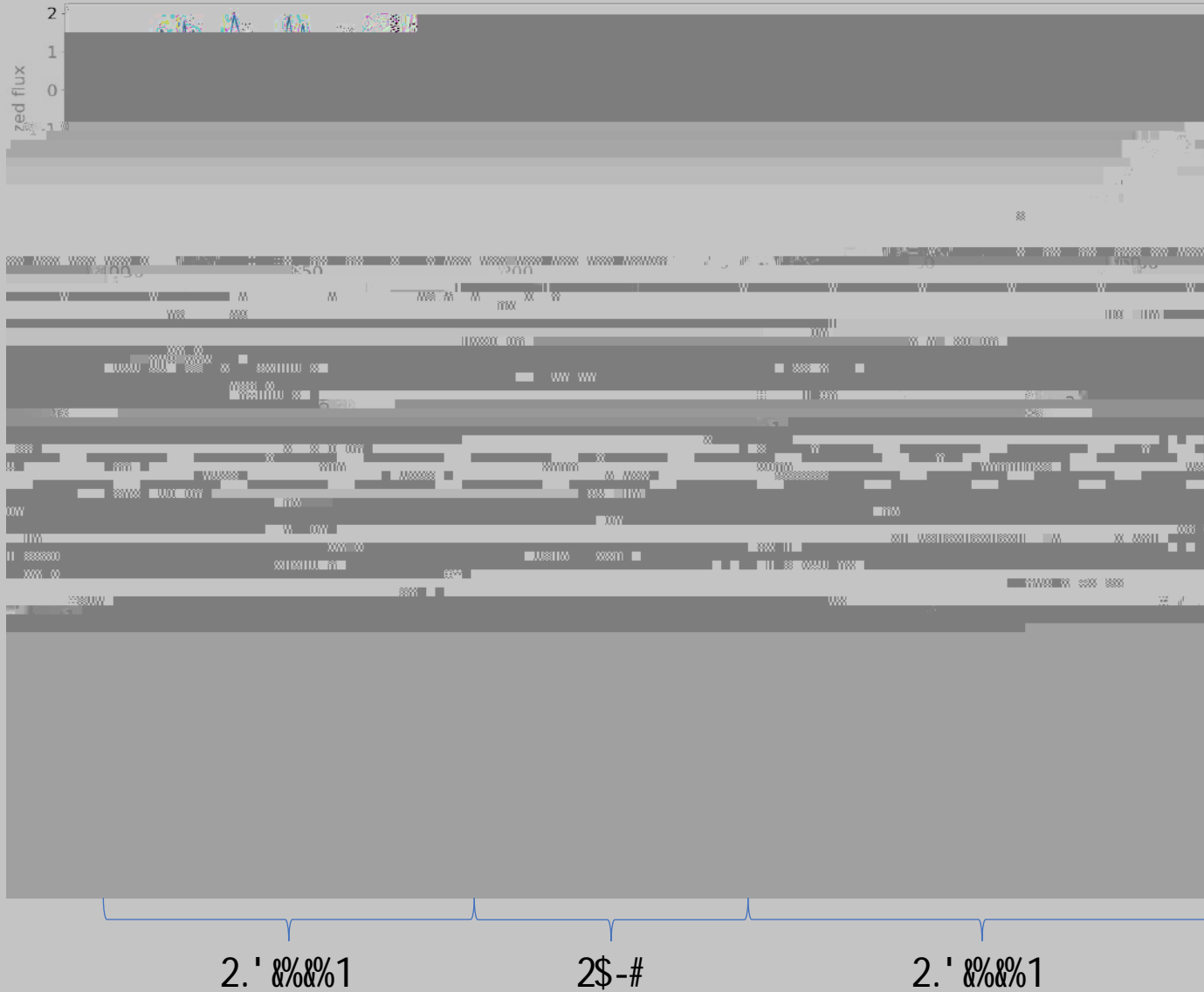


The architecture



Model's validation

5" ..\$B#&%1)89&#g\$.)
3&14#)56.7\$-

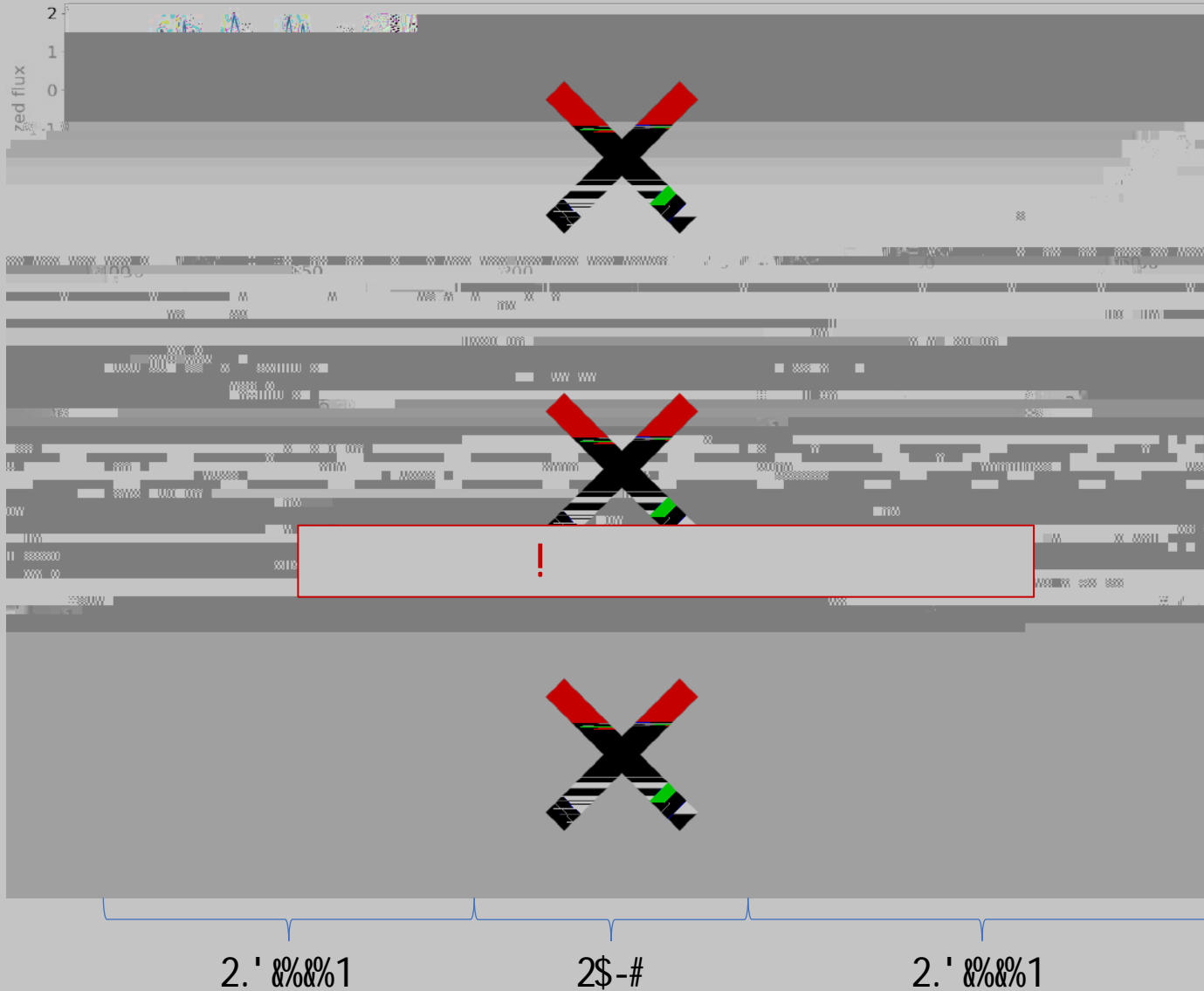


A[

?".7'%)\$#)'(V)NONO

Model's validation

5" ..\$B#&%1)89&#g\$.)
3&14#)56.7\$-



A[

?".7'%)\$#)'(V)NONO

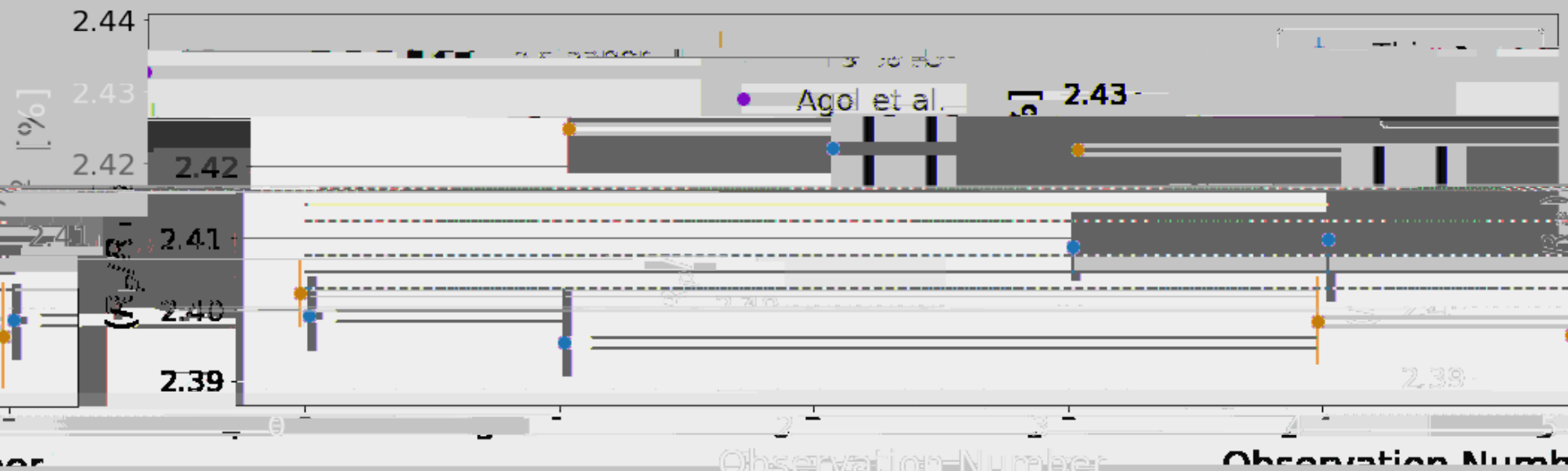


! . \$ 0 & B # & ' " %) j) 2 . ' % - & #) d & #

5 " .. \$ B # & % 1) 8 9 & # g \$.)
3 & 1 4 #) 5 6 . 7 \$ -

! . \$ 0 & B # & ' " %) j) 2 . ' % - & #) d & #

5 " . \$ B # & % 1) 8 9 & # g \$.)
3 & 1 4 #) 5 6 . 7 \$ -



5 "%B(6-&"%

- ? ' %G)\$X"9(' %\$#-)
- ? ' %G) / ' %G>(&14#)B6.7\$-)
- = ".D)"%)89&#g\$..)
 - ! 382?) / "0\$(-)#&/ \$)0\$9\$%0\$%B&\$-)&%)&%0&7&06' ()35-)
 - ! e-\$*6()**.) V))
- ! .\$(&/ &% ' .G)I " .D)"%)2H88)
 - ! 4"9\$-)*" .)')
- 2" I ' .0-)')1("C' (E)' 6#" / ' #&B)0\$#.\$%0&%1)9&9\$(&%\$Y)
- = "6(0)C\$)1.\$' #)*" .)>= 82E)54\$"9-E)! (' #'E)@.&\$(_

? " .7' %E)? V]NOAPE]M\$S\$9@+2.' %-#-.)@(&C.' .G)** .)8#\$.9"(' #8%1' %O)O\$#. \$%O8%1)#.' %-#)(14#)B6.7\$-E)A]VO]O]E]k\$%"O"EO"t;)A]POOPANN])
244+). \$-S' .B4) / ' OS)6-\$)"3814#D6.7\$D)! G#4""%)9' BD' 1S)"") I \$9(\$.) %O)2H88)O' #')' %' (G-4-)R3814#D6.7\$)5"(' C".' #8"%E]NOAcSV

```
@1"0]H]5"1' %), F]J] %64."%)h[e]M]S/ B]1]M]B]S"$%)h]D]S]0] (@]NOAcO] V]"N]A]R]S:Ac]b]A]m]^  
5' --"%)=]0] 6C' -)M]B]F]S' 6]8]6]-]1]Q]M" / B]M]D]?]Q]h" %S]I] D]S]0] (@]NOAcM] V][c]A]R" T]c]O]S:Ab"m]b]P  
8' (8' -)M]D]d(6]K]D]S.]' D]J' -4' 6-)@]NOAc"Q]
```

24' %D)G" 6

!"#\$%&' (