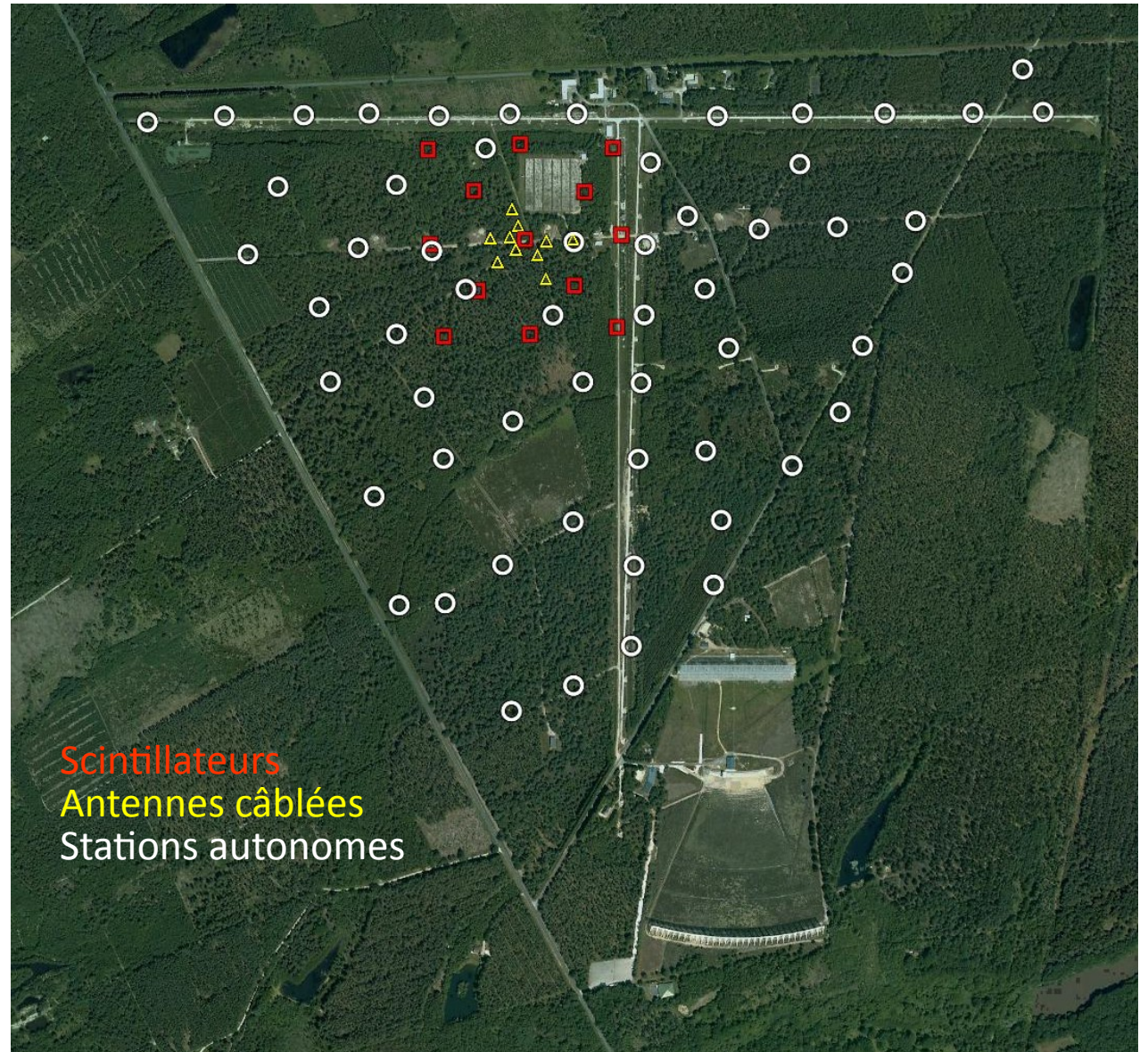


# Instruments à Nançay

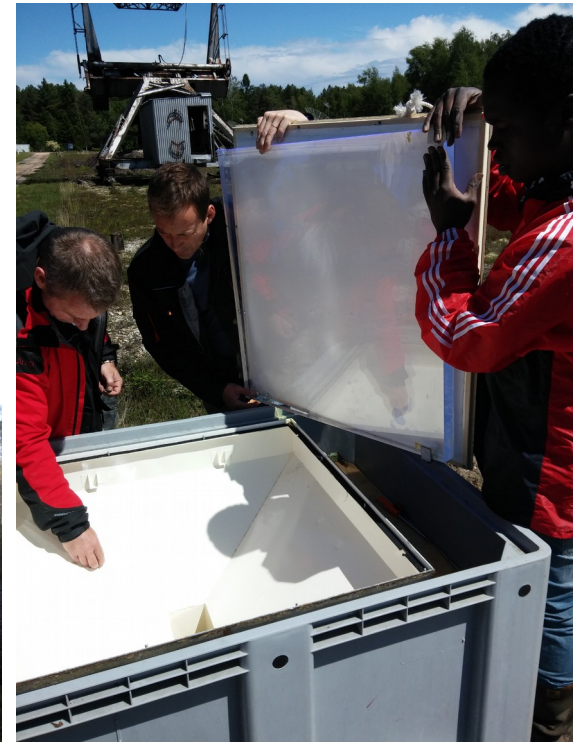
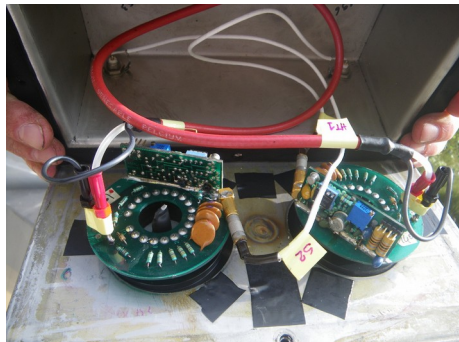
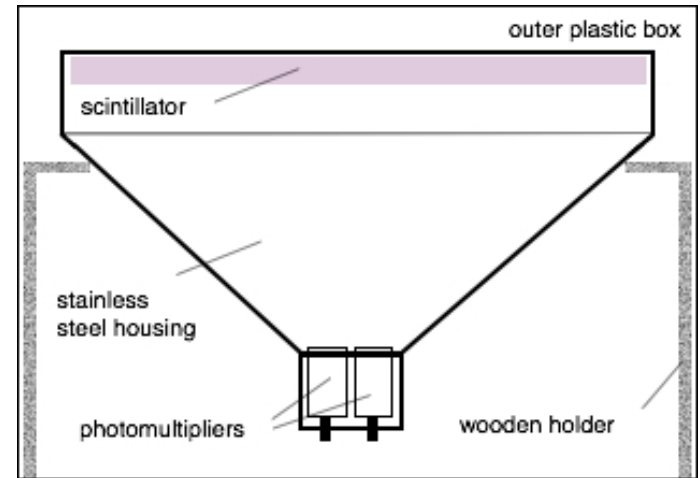
- Quoi
- Comment
- A quel rythme
- Limites/défauts





# Scintillateurs

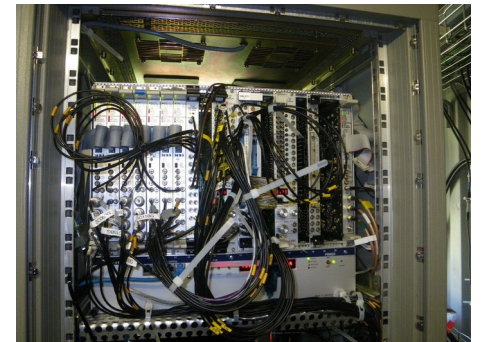
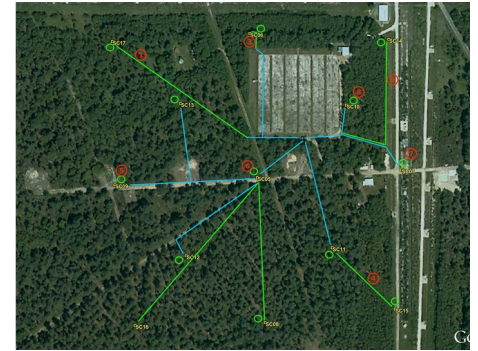
- Un détecteur de particules





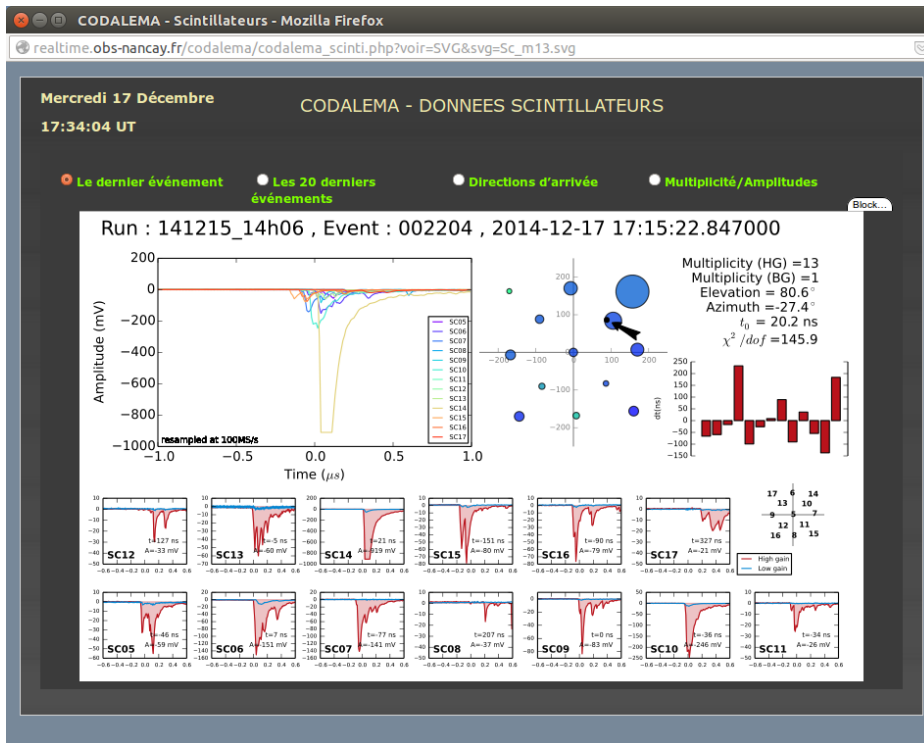
# Scintillateurs

- 13 détecteurs reliés
- Discrimination et somme en temps réel sur les signaux de chaque scintillateur : production d'un « trigger » pour la numérisation et les autres instruments !
- On demande des signaux en coïncidence dans 5 scintillateurs : on sélectionne les grandes gerbes
- On échantillonne la distribution au sol des particules dans une zone de  $300 \times 300 \text{ m}^2$
- On date les événements retenus à la ns près (MC250)

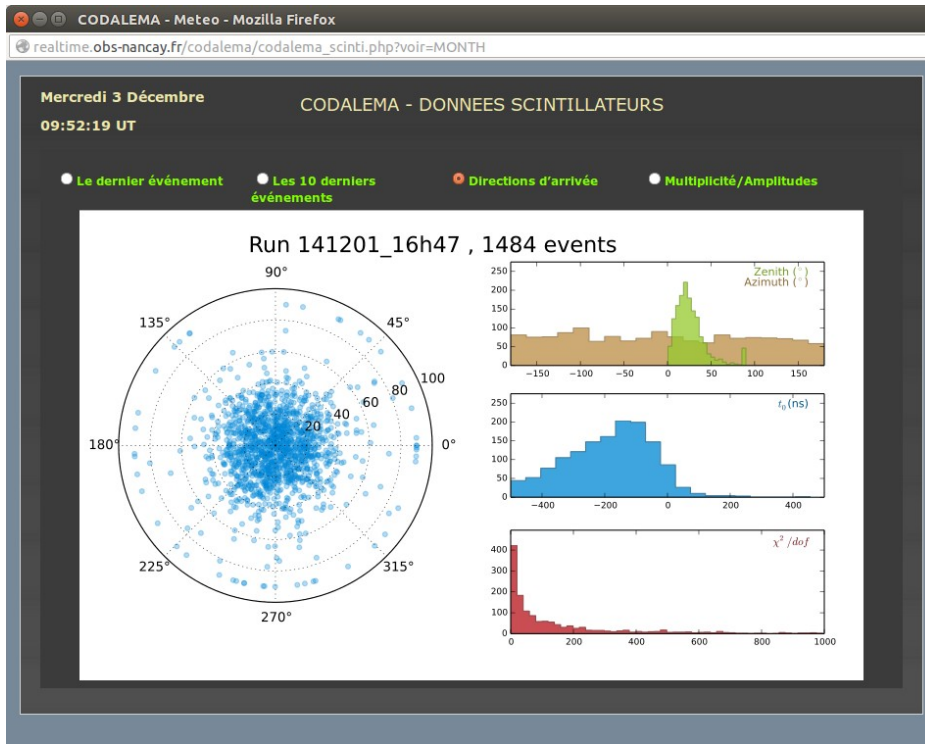


# Scintillateurs

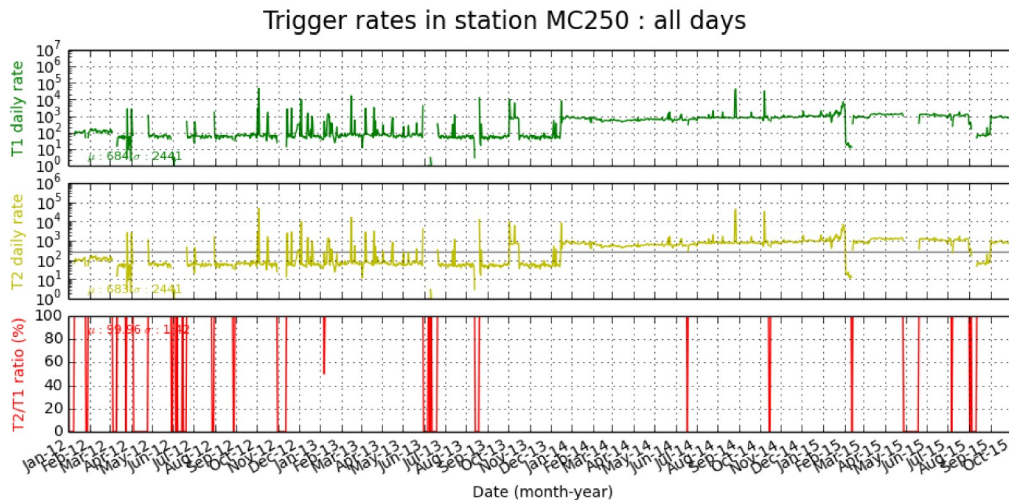
- Numérisation des signaux a 1 GS/s et sur  $2,5 \mu\text{s}$ .
- Le signal des particules durent moins de  $1 \mu\text{s}$ .
- Les décalages en temps donnent la direction d'arrivée
- Les différences en amplitude donnent l'énergie du rayon cosmique
- Les deux gains permettent de couvrir une grande dynamique



# Scintillateurs

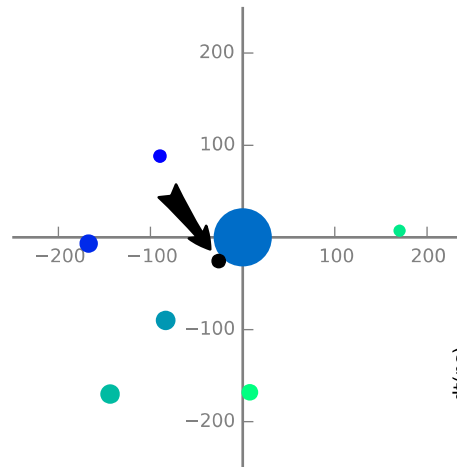
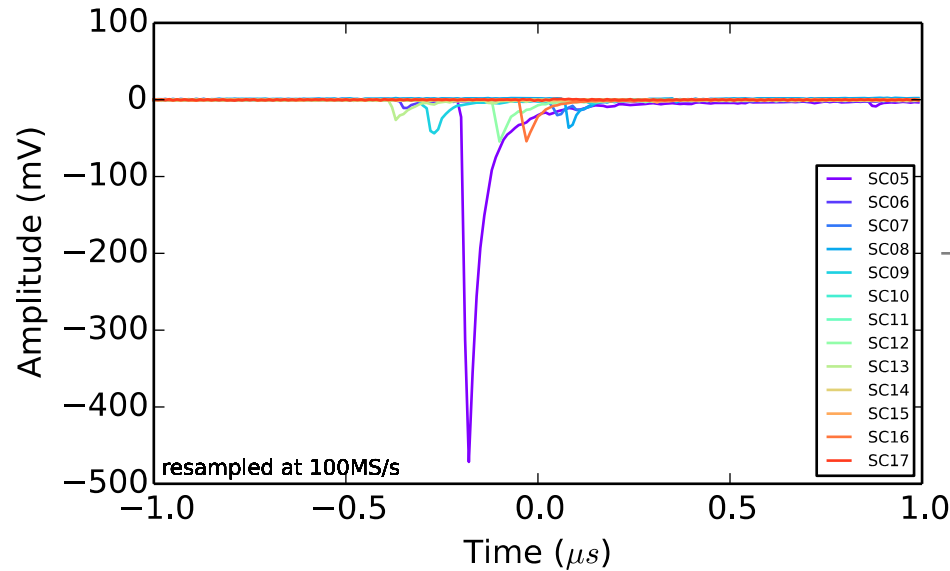


- Les gerbes enregistrées sont « peu » nombreuses. Les RC qui nous intéressent ont une énergie supérieure à  $10^{16}$  eV
- Taux d'acquisition entre quelques RC/h et 1 RC/2mn

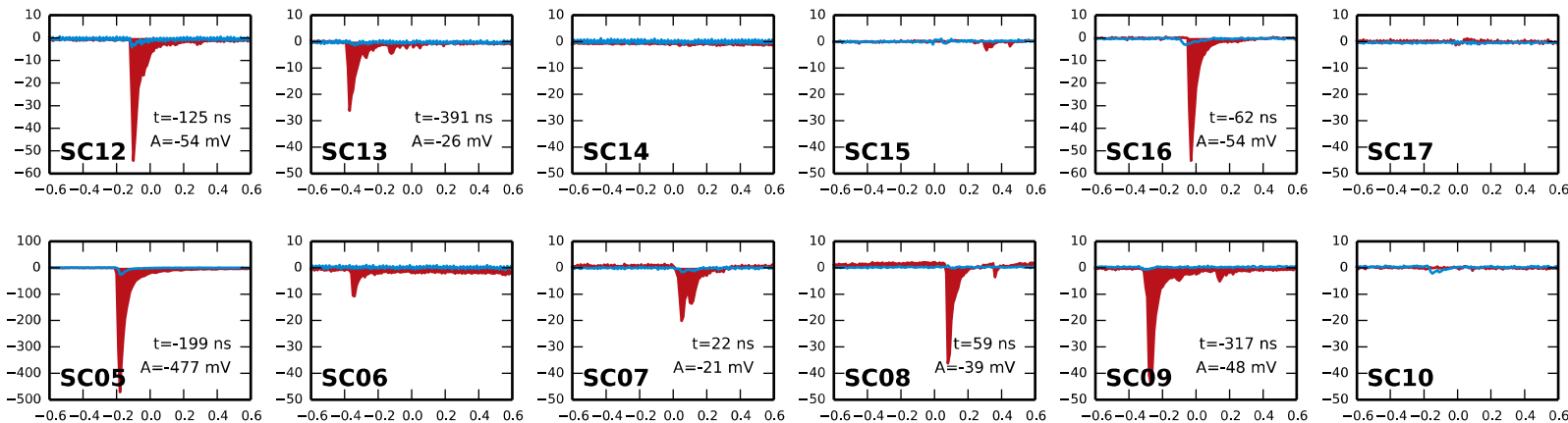
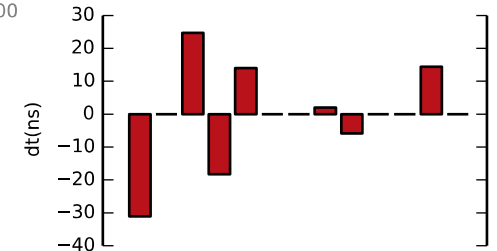


# Quelques événements

Run : 150611\_11h21 , Event : 000153 , 2015-06-11 16:39:42.990000



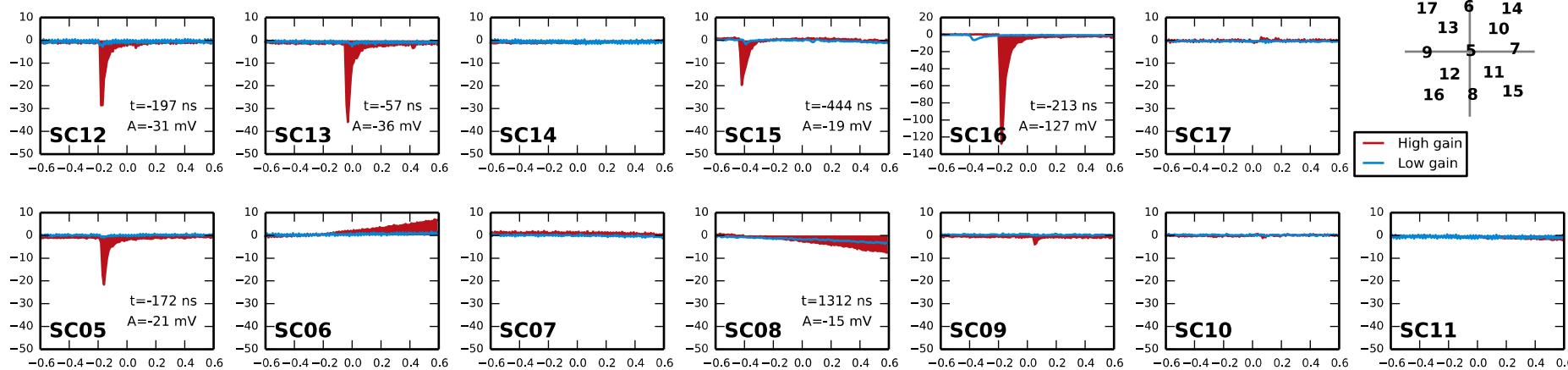
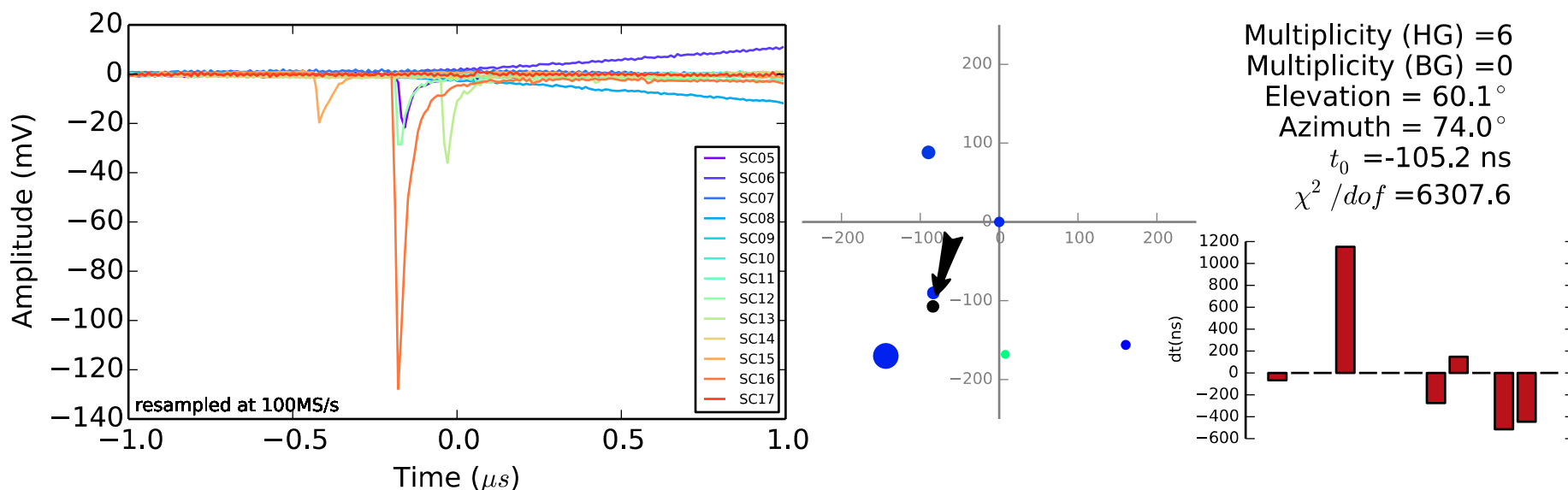
Multiplicity (HG) = 7  
 Multiplicity (BG) = 1  
 Elevation =  $58.4^\circ$   
 Azimuth =  $126.2^\circ$   
 $t_0 = -168.0$  ns  
 $\chi^2 / dof = 5.9$



17	6	14
13		10
9	5	7
12		11
16	8	15

# Quelques événements

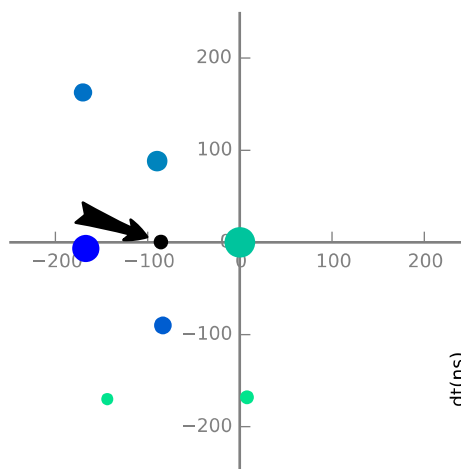
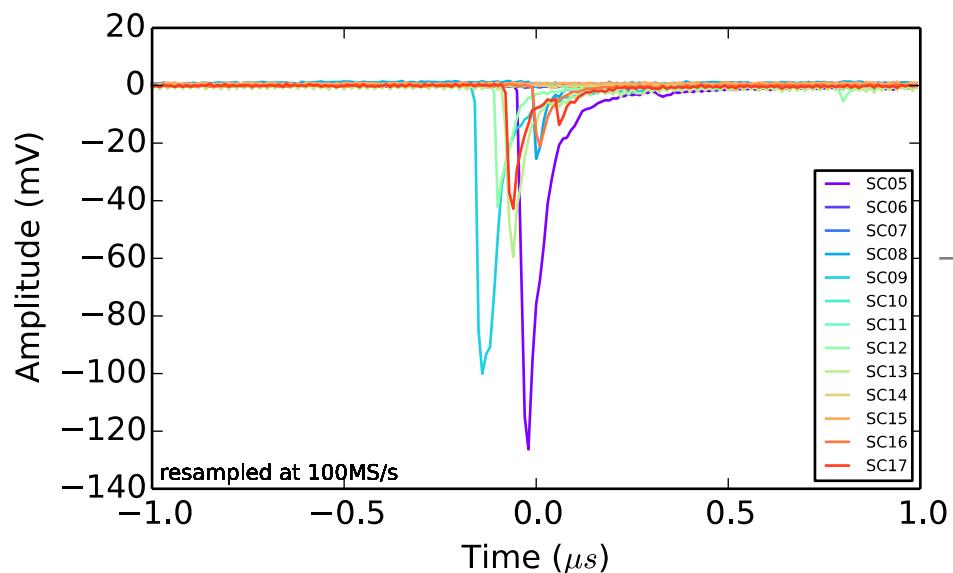
Run : 150611\_11h21 , Event : 000154 , 2015-06-11 16:40:07.596000



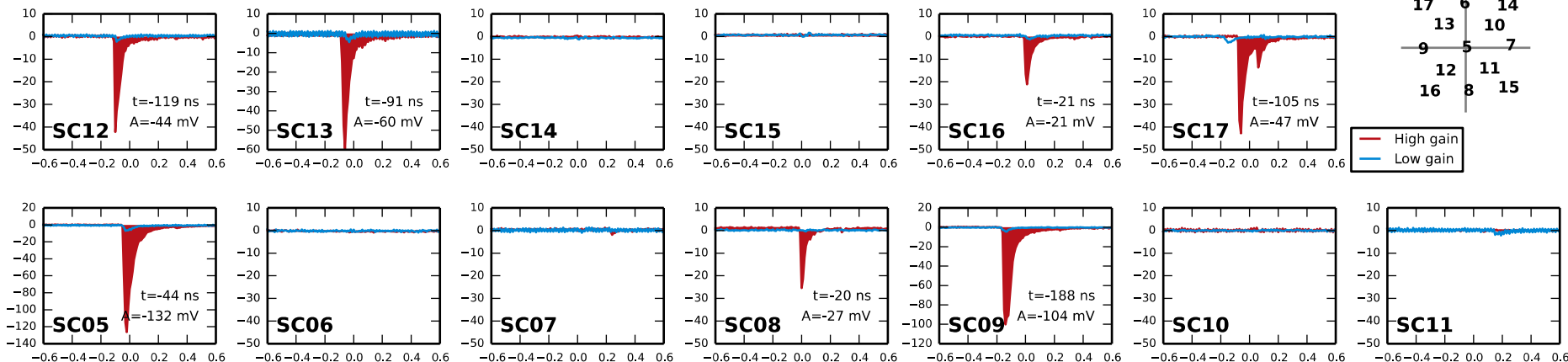


# Quelques événements

Run : 150611\_11h21 , Event : 000155 , 2015-06-11 16:40:35.795000



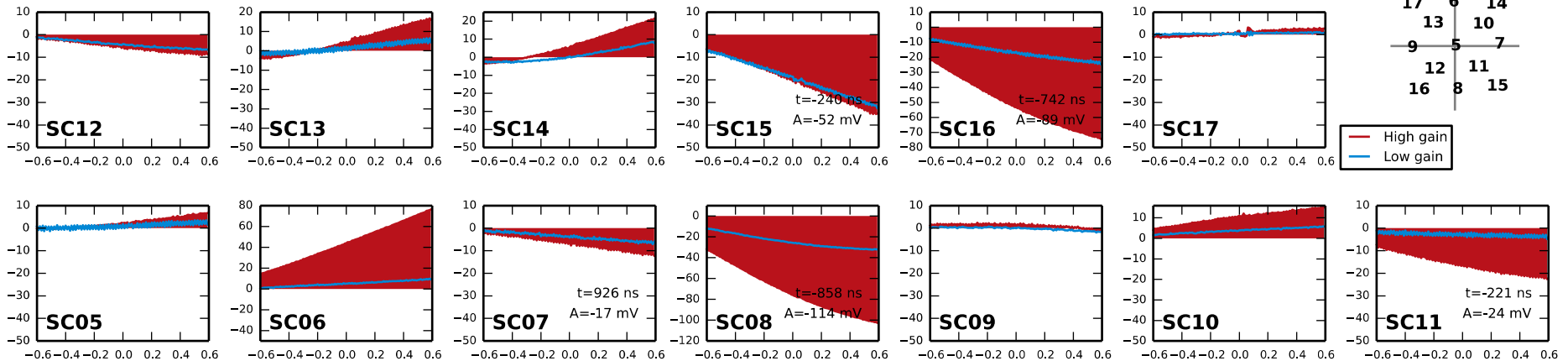
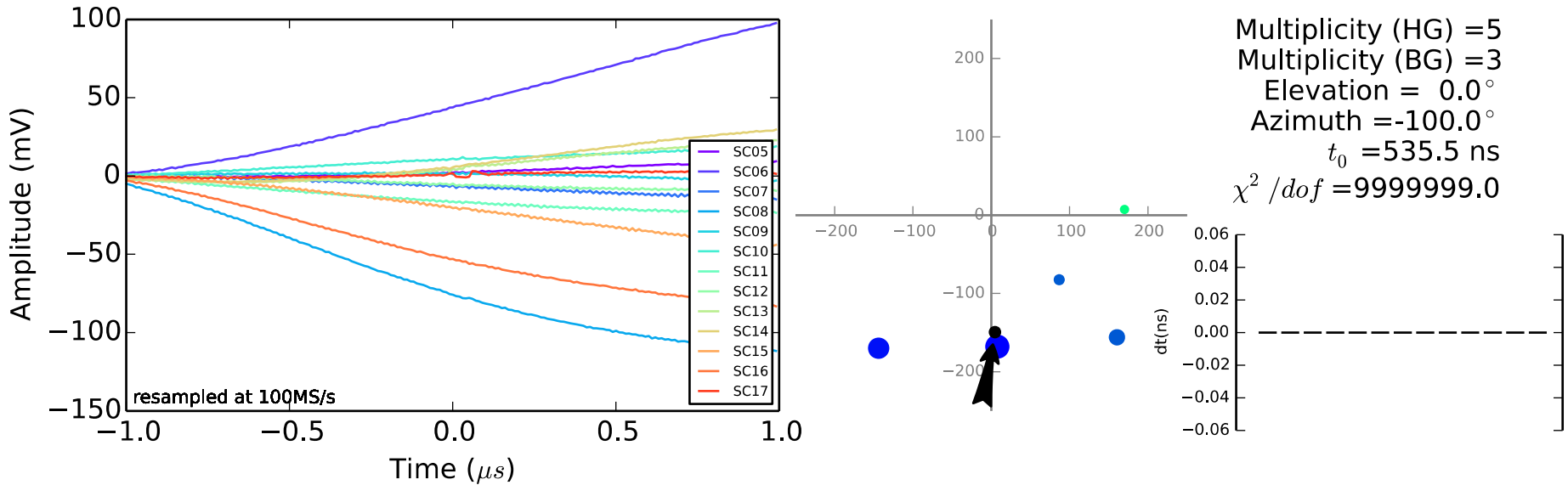
Multiplicity (HG) = 7  
 Multiplicity (BG) = 0  
 Elevation =  $82.8^\circ$   
 Azimuth =  $160.2^\circ$   
 $t_0 = -51.3 \text{ ns}$   
 $\chi^2 / \text{dof} = 32.1$





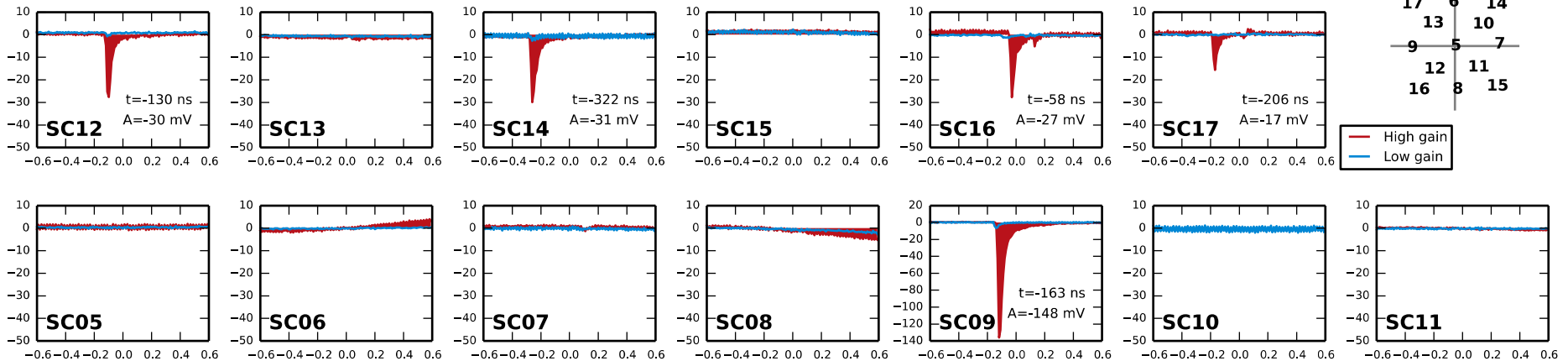
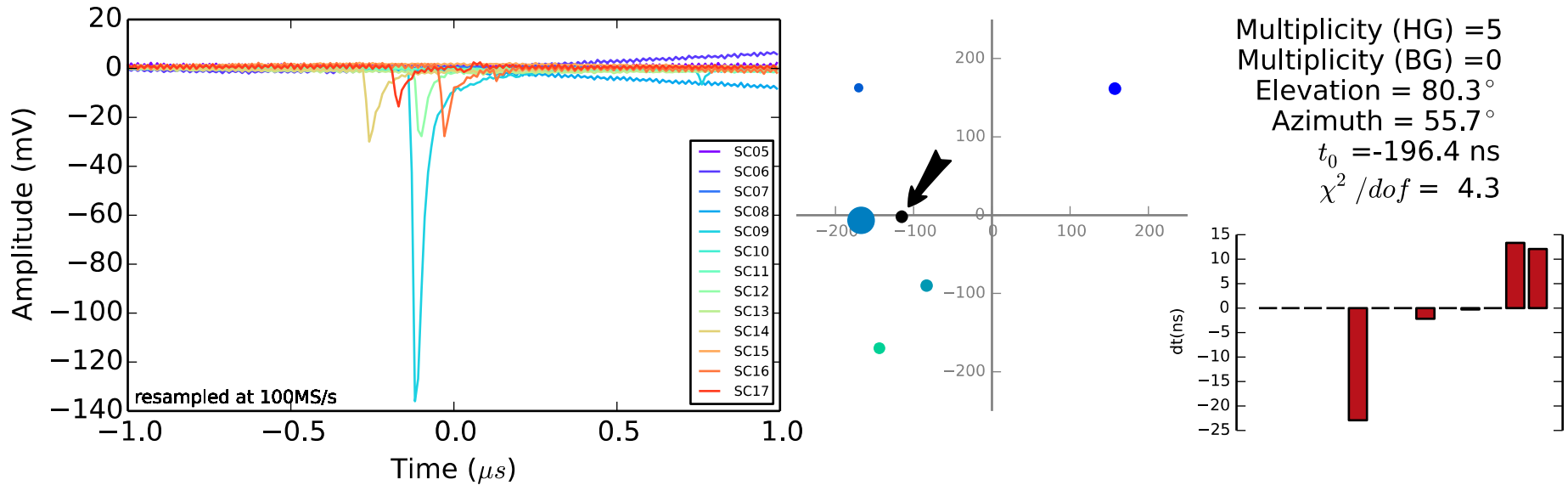
# Quelques événements

Run : 150611\_11h21 , Event : 000156 , 2015-06-11 16:43:01.404000



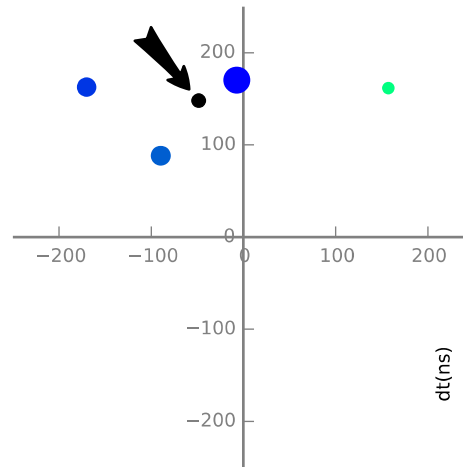
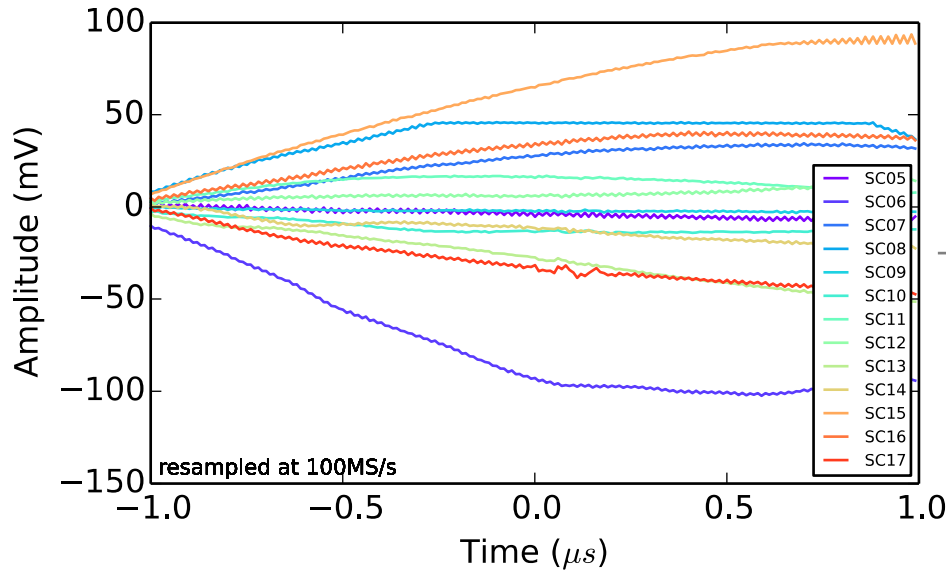
# Quelques événements

Run : 150611\_11h21 , Event : 000157 , 2015-06-11 16:45:20.097000

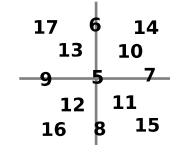
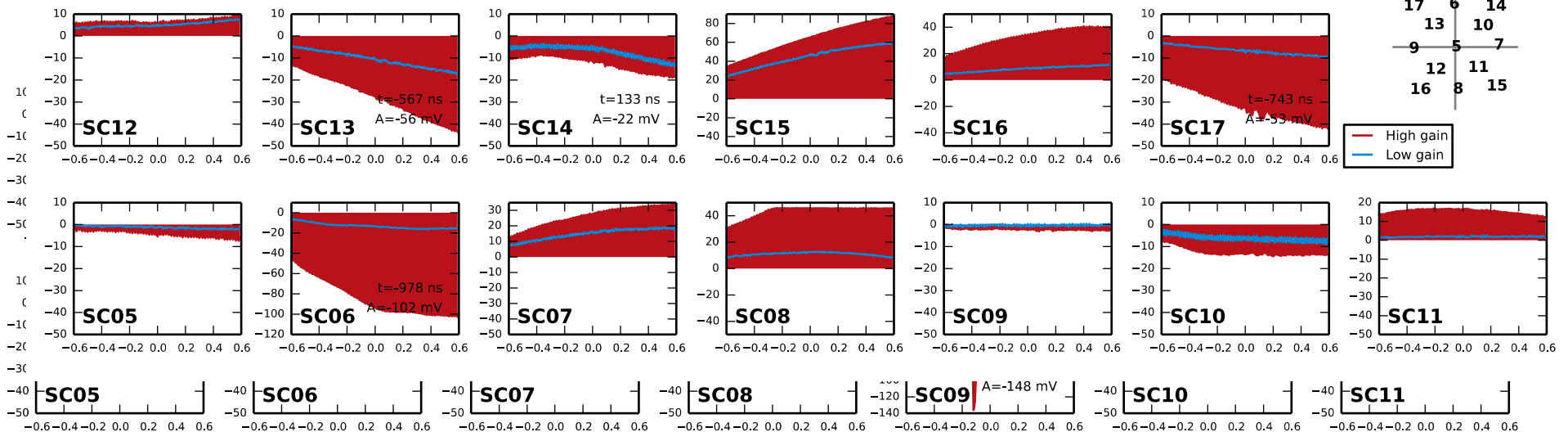
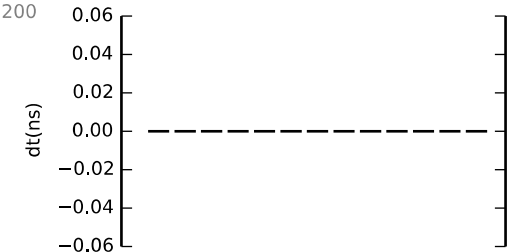


# Quelques événements

Run : 150611\_11h21 , Event : 000158 , 2015-06-11 16:46:02.923000



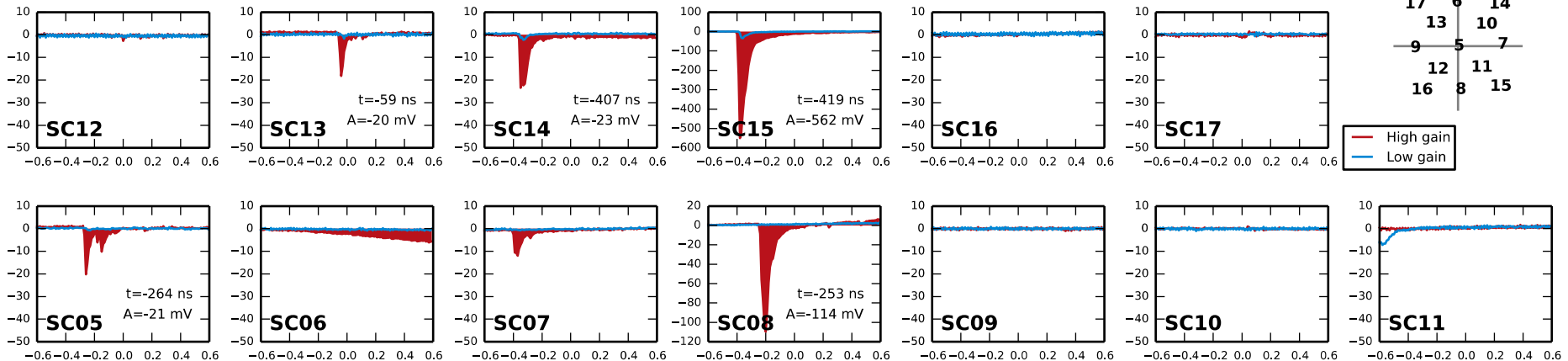
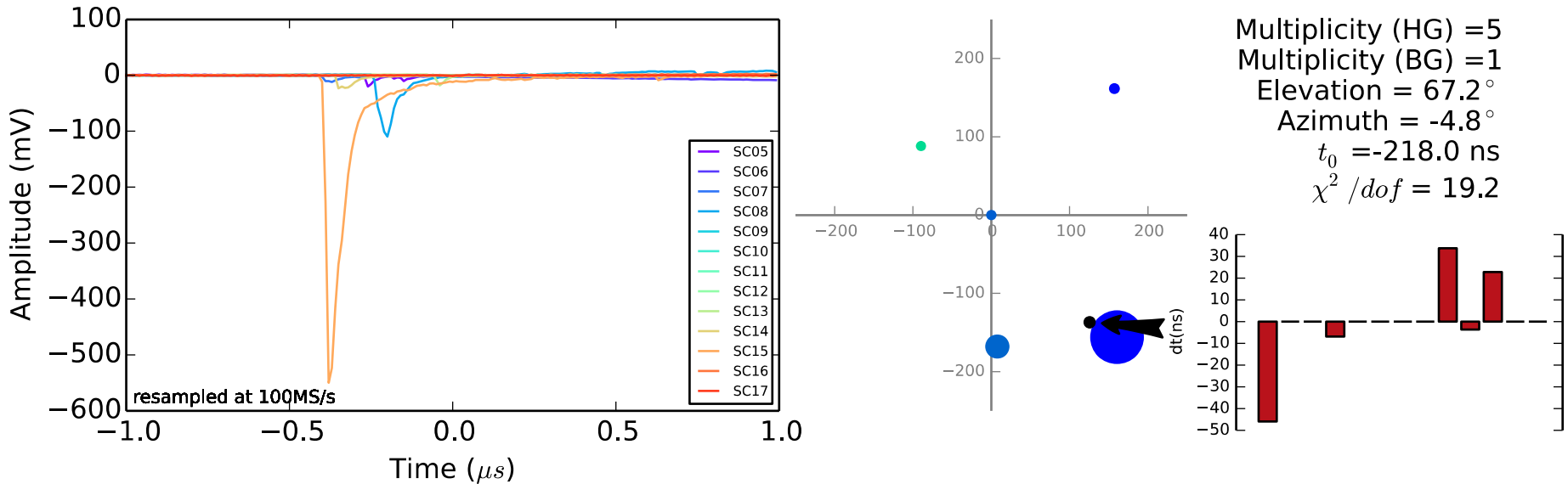
Multiplicity (HG) = 4  
 Multiplicity (BG) = 3  
 Elevation =  $0.0^\circ$   
 Azimuth =  $130.0^\circ$   
 $t_0 = 13.4$  ns  
 $\chi^2 / dof = 9999999.0$





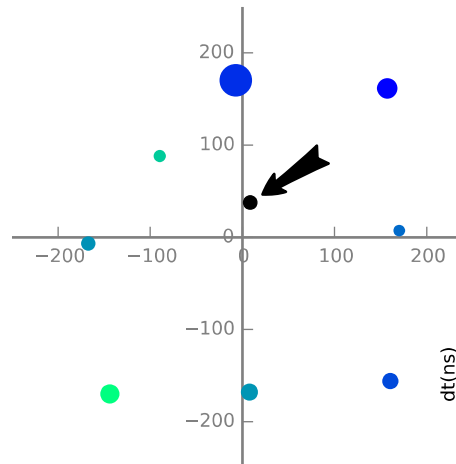
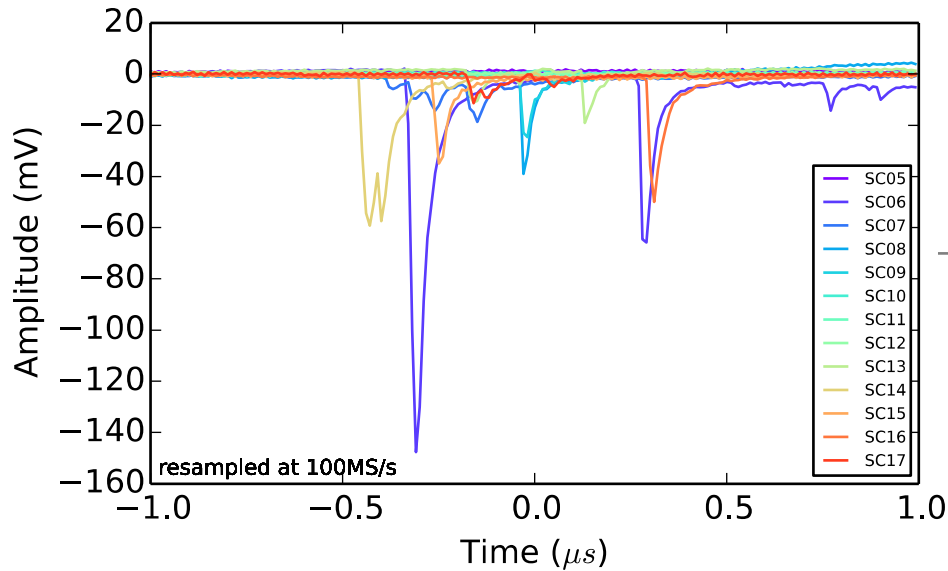
# Quelques événements

Run : 150611\_11h21 , Event : 000159 , 2015-06-11 16:46:10.689000

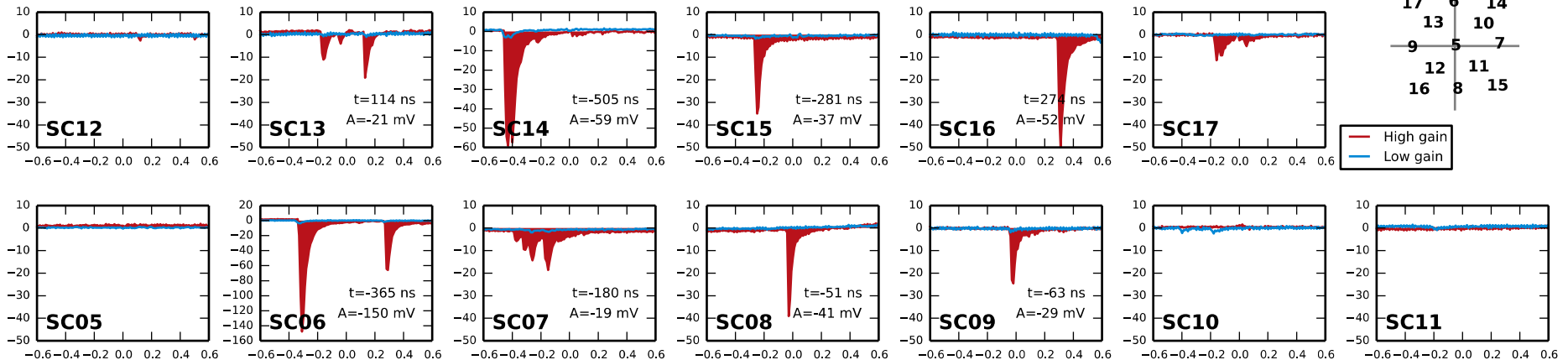
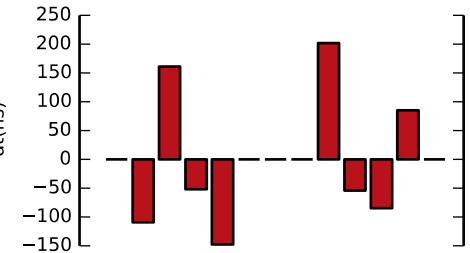


# Quelques événements

Run : 150611\_11h21 , Event : 000160 , 2015-06-11 16:46:53.745000

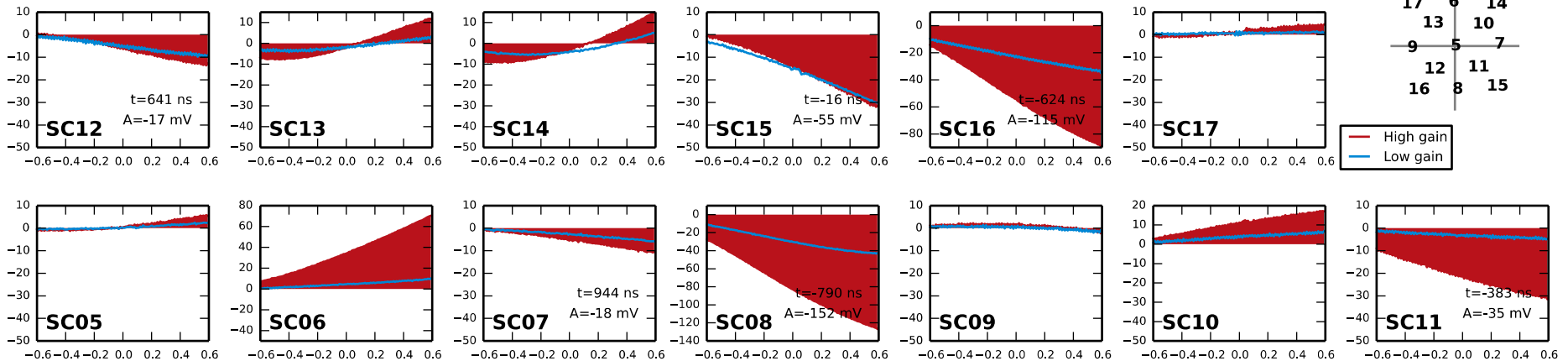
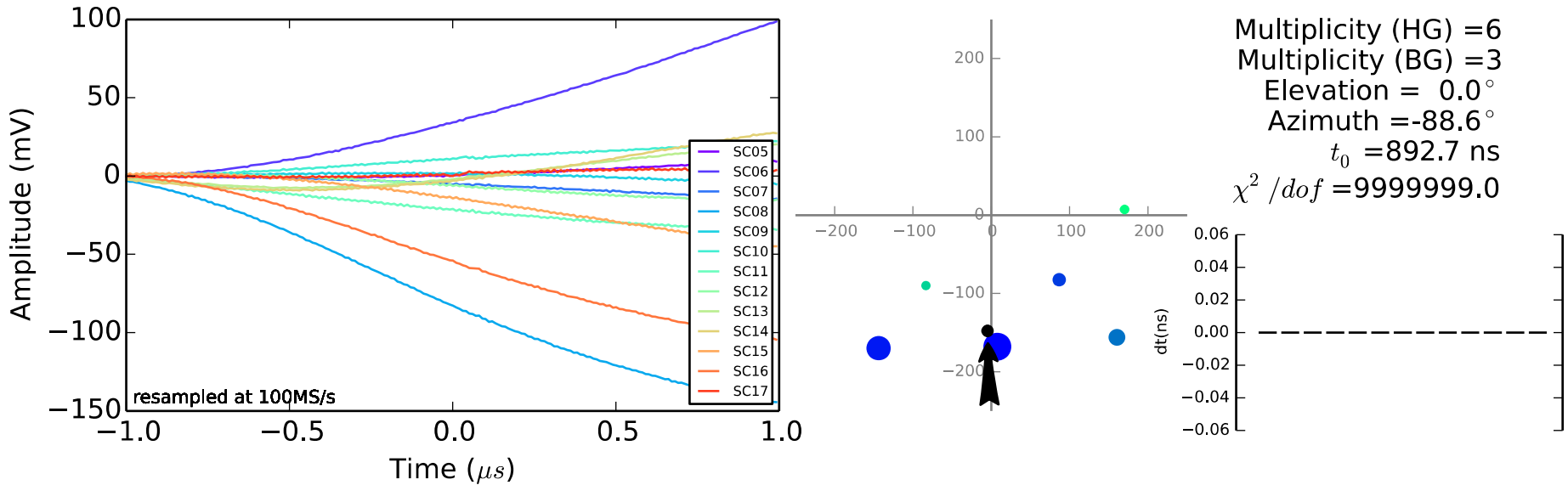


Multiplicity (HG) = 8  
 Multiplicity (BG) = 0  
 Elevation =  $63.8^\circ$   
 Azimuth =  $33.5^\circ$   
 $t_0 = -126.2$  ns  
 $\chi^2 / dof = 240.8$



# Quelques événements

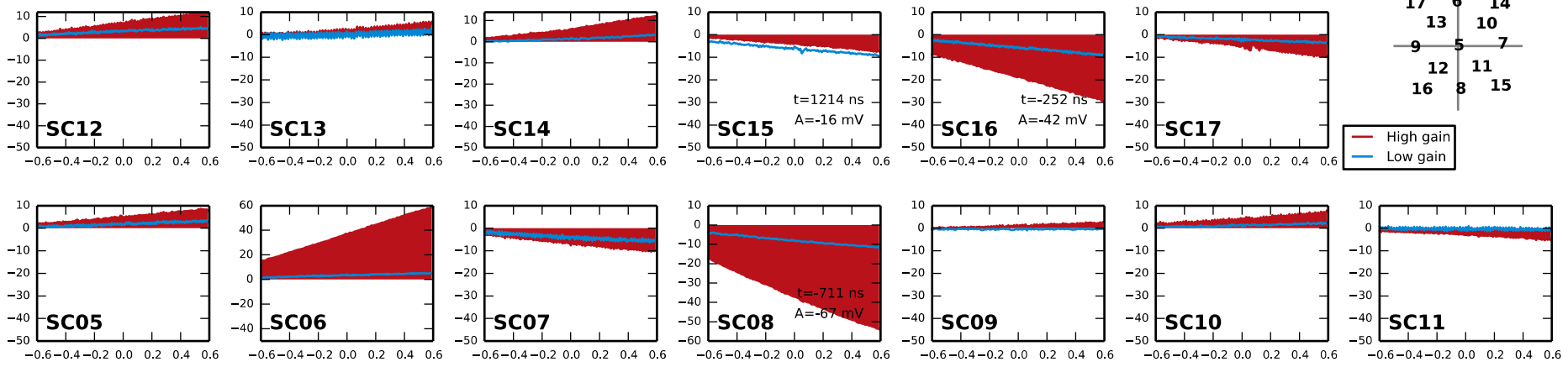
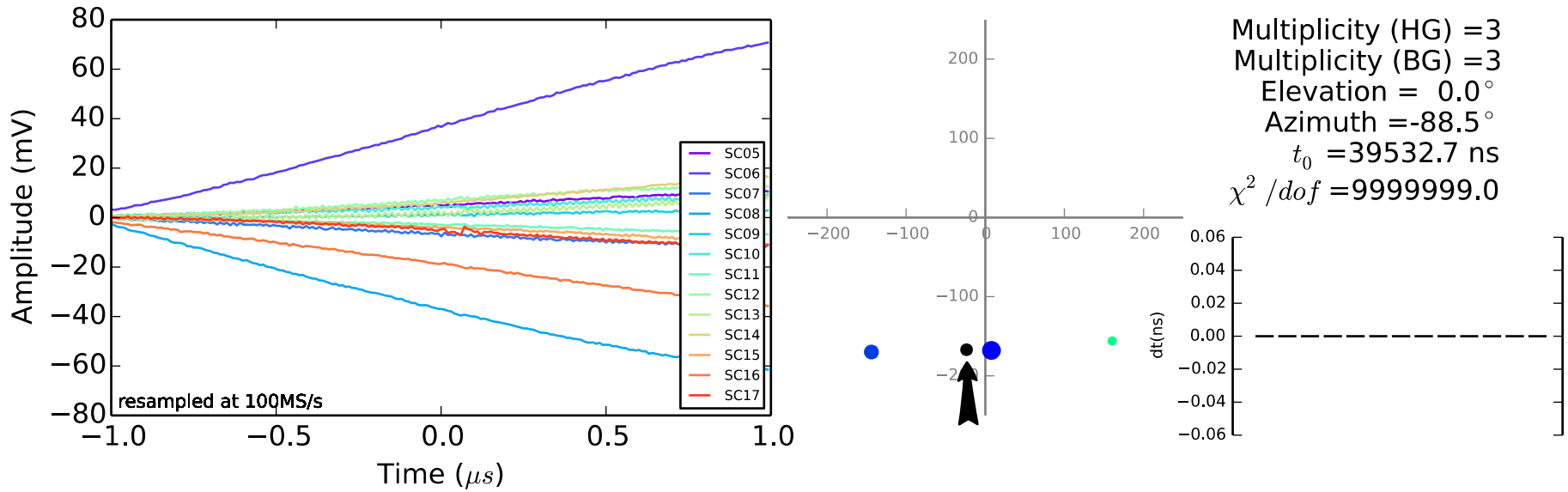
Run : 150611\_11h21 , Event : 000161 , 2015-06-11 16:48:39.591000





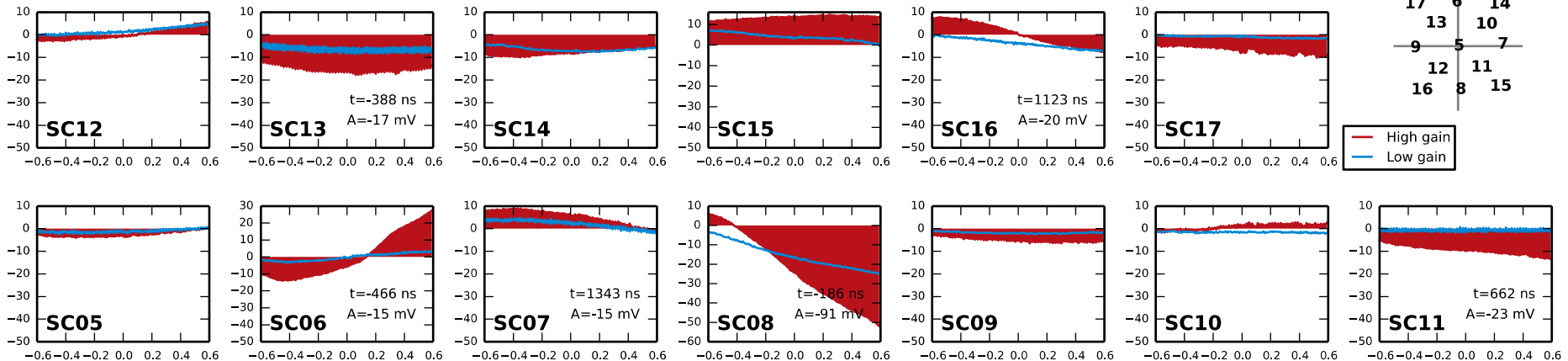
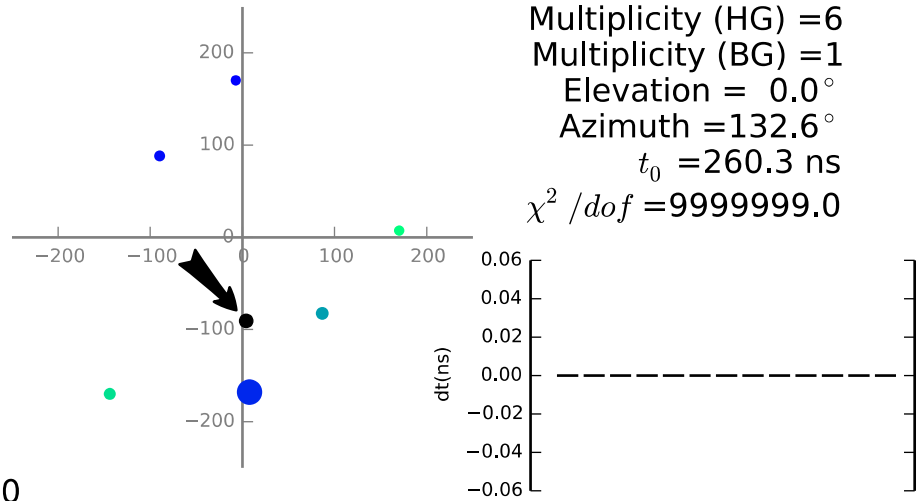
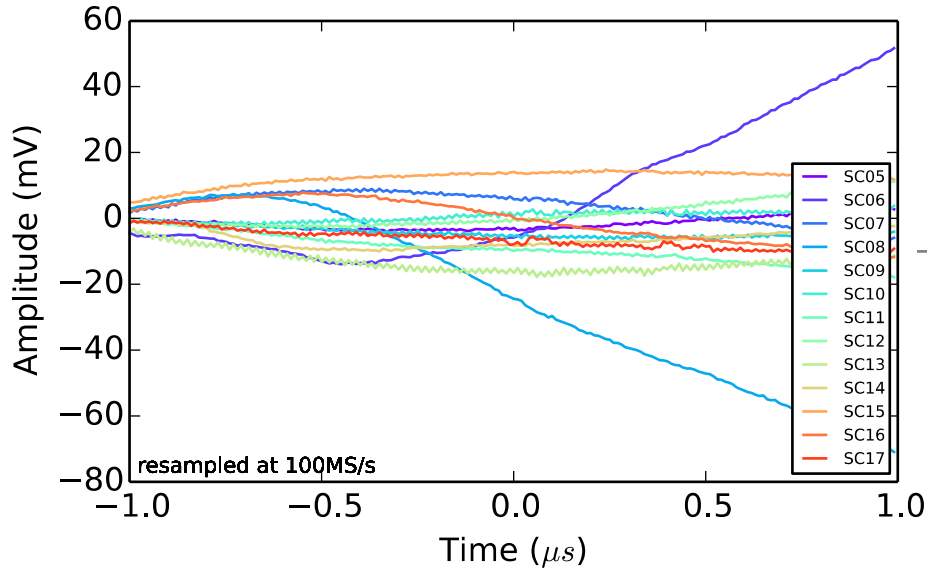
# Quelques événements

Run : 150611\_11h21 , Event : 000162 , 2015-06-11 16:49:32.500000



# Quelques événements

Run : 150611\_11h21 , Event : 000163 , 2015-06-11 16:51:27.112000

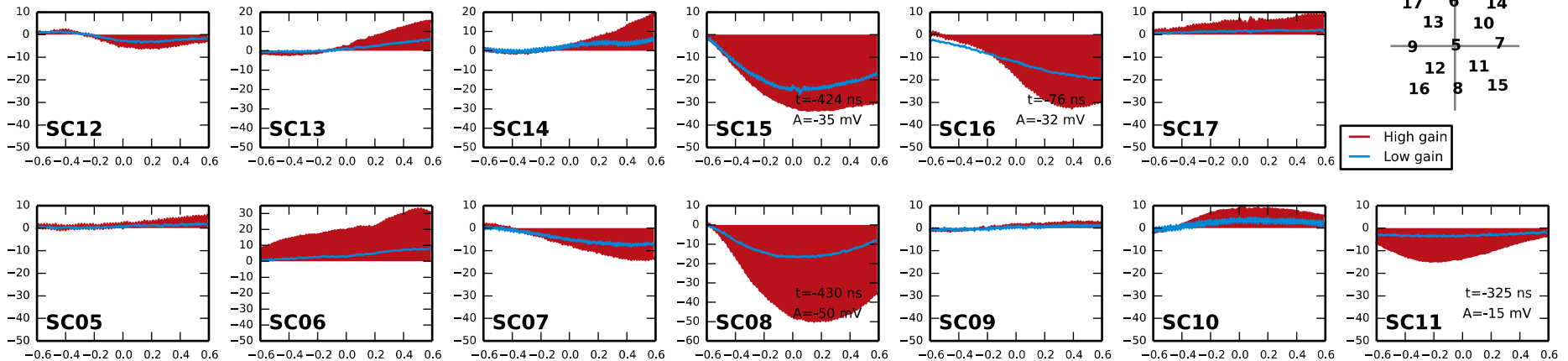
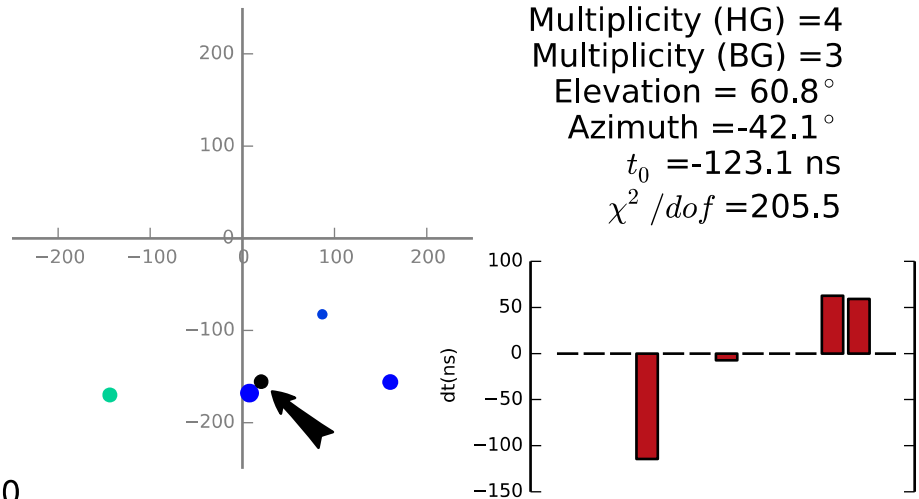
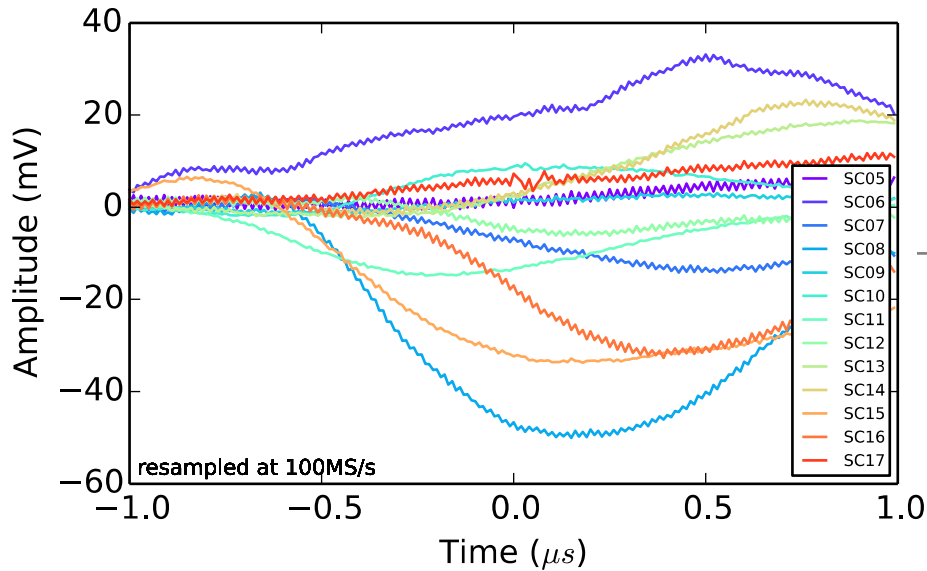


17	6	14
13		10
9	5	7
	12	11
16	8	15

— High gain  
— Low gain

# Quelques événements

Run : 150611\_11h21 , Event : 000164 , 2015-06-11 16:52:50.915000





# Scintillateurs

- Les scintillateurs voient les orages
- Ils ne voient que les éclairs pendant les périodes orageuses
- Blinder les détecteurs pour avoir les particules ?