Retroreflector systems used in laser ranging of geodetic and navigation satellites
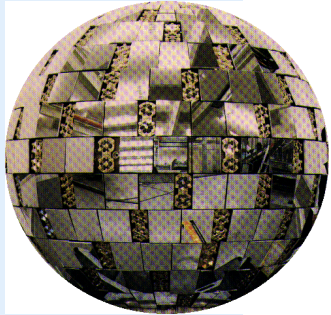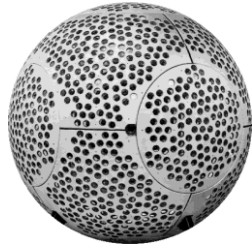
GFZ-1 / Russia

LARETS / Russia
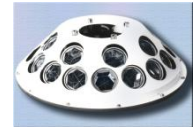
Ajisai / Japan

ETALON / Russia
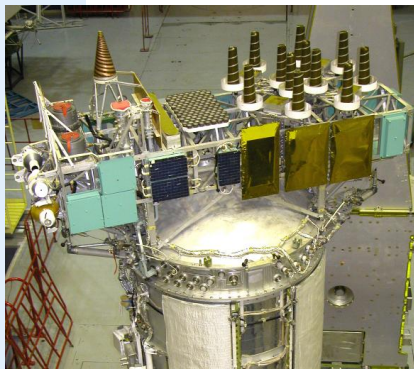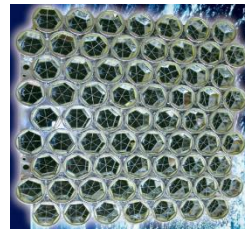
LAGEOS / USA
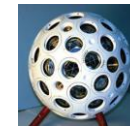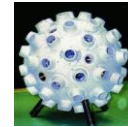
WESTPAC / Russia

METEOR / Russia

GLONASS / Russia
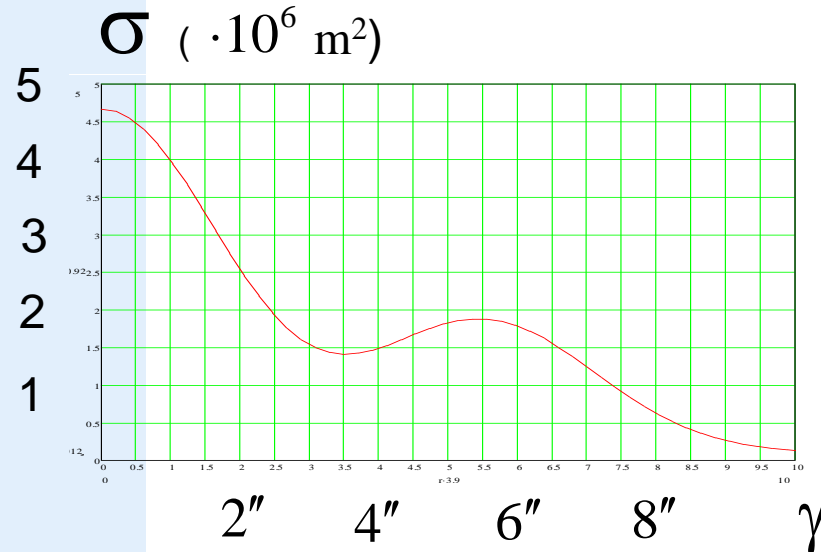
Compas / China

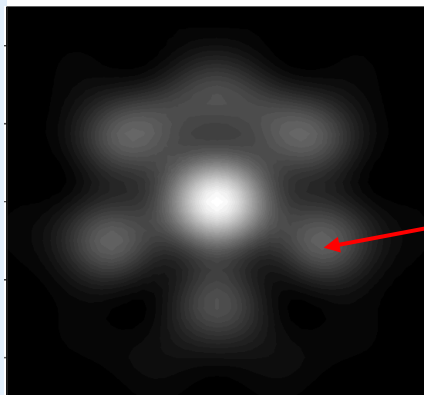GIOVE / Russia

GPS №35,36 / Russia

FFDP and cross-section of CCR (TIR). Diameter – 28 mm

CS of one CCR

Average CS for the four turned CRR
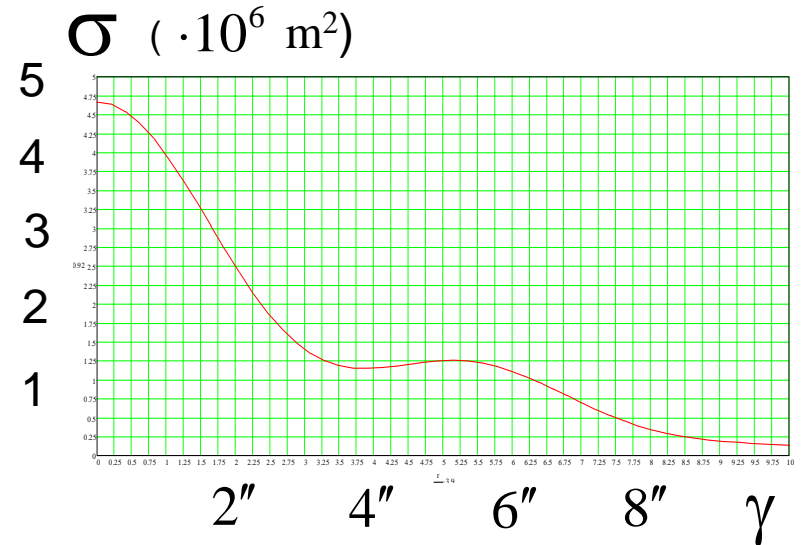
$\sigma \ (\cdot 10^6 \ \text{m}^2)$

$\sigma \ (\cdot 10^6 \ \text{m}^2)$

$$CS = 1{,}2 \cdot 10^6 \, \text{m}^2$$

$$CS = 1{,}9 \cdot 10^6 \, \text{m}^2$$
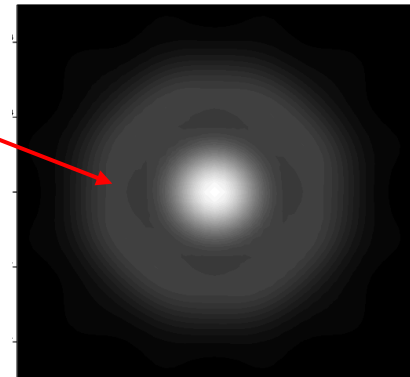
Amplitude-phase relations of 6 output beams (CCR-TIR)

$$T_{x5} = 0,6655\exp(j\frac{65,53}{180}\pi)$$

$$T_{x6} = 0,6555\exp(j\frac{65,53}{180}\pi)$$

$$T_{x4} = 0,9628\exp(-j\frac{30,68}{180}\pi)$$

$$T_{x1}\,0,9628\exp(-j\frac{30,68}{180}\pi)$$

$$T_{x3} = 0,6655\exp(j\frac{65,53}{180}\pi)$$

$$T_{x2} = 0,6655\exp(j\frac{65,53}{180}\pi)$$

$$T_{y5} = 0,7552\exp(j\frac{96,17}{180}\pi)$$

$$T_{y6} = 0,7552\exp(-j\frac{83,83}{180}\pi)$$

$$T_{y4} = 0,2701\exp(-j\frac{152,88}{180}\pi)$$

$$T_{y1} = 0,2701\exp(j\frac{27,12}{180}\pi)$$

$$T_{y3} = 0,7552\exp(-j\frac{41,93}{180}\pi)$$

$$T_{y2} = 0,7552\exp(j\frac{138,08}{180}\pi)$$
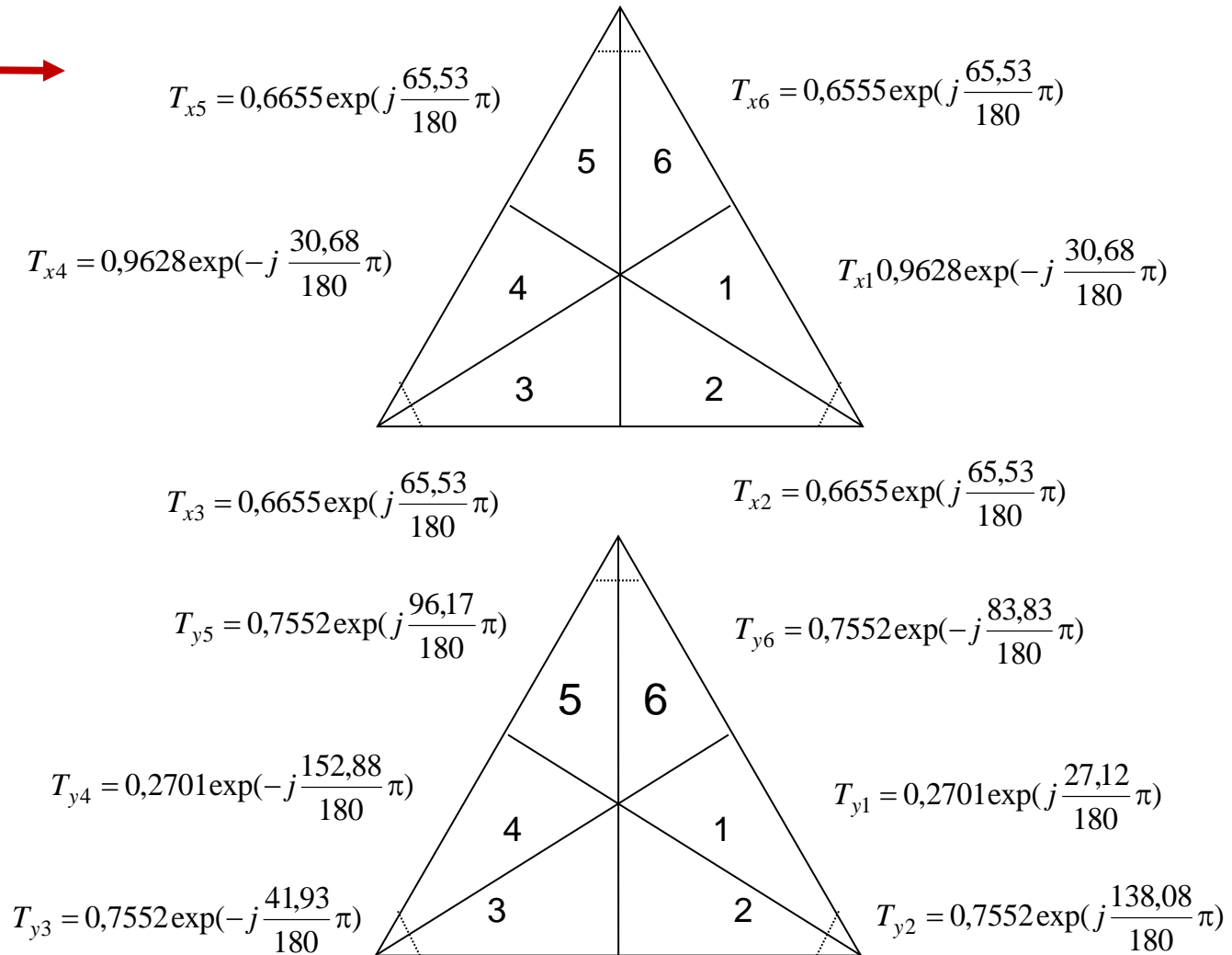
FFDP of CCR with DAO (dihedral angle offset). Signs: plus and minus

Value of the error is exaggerated

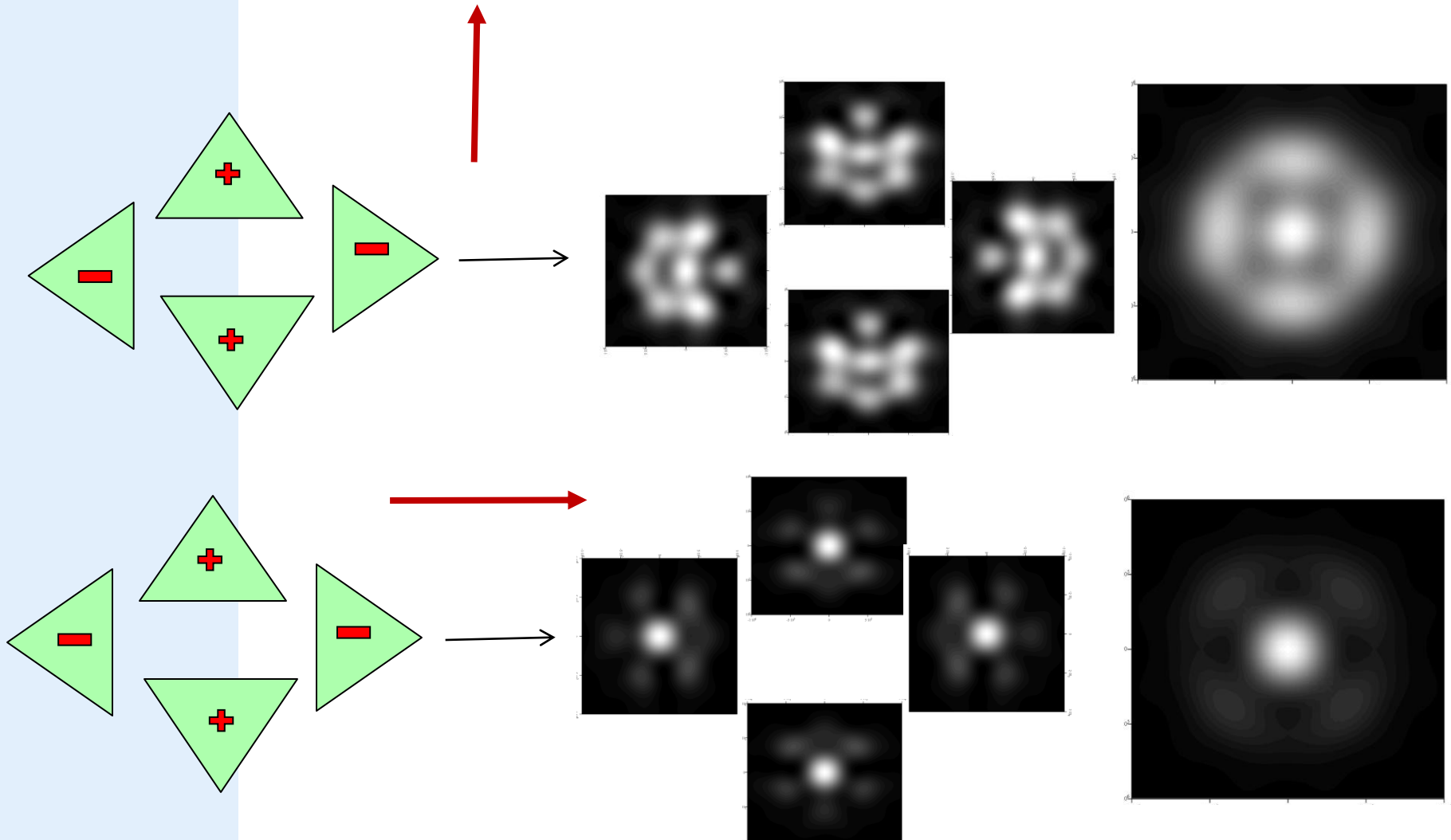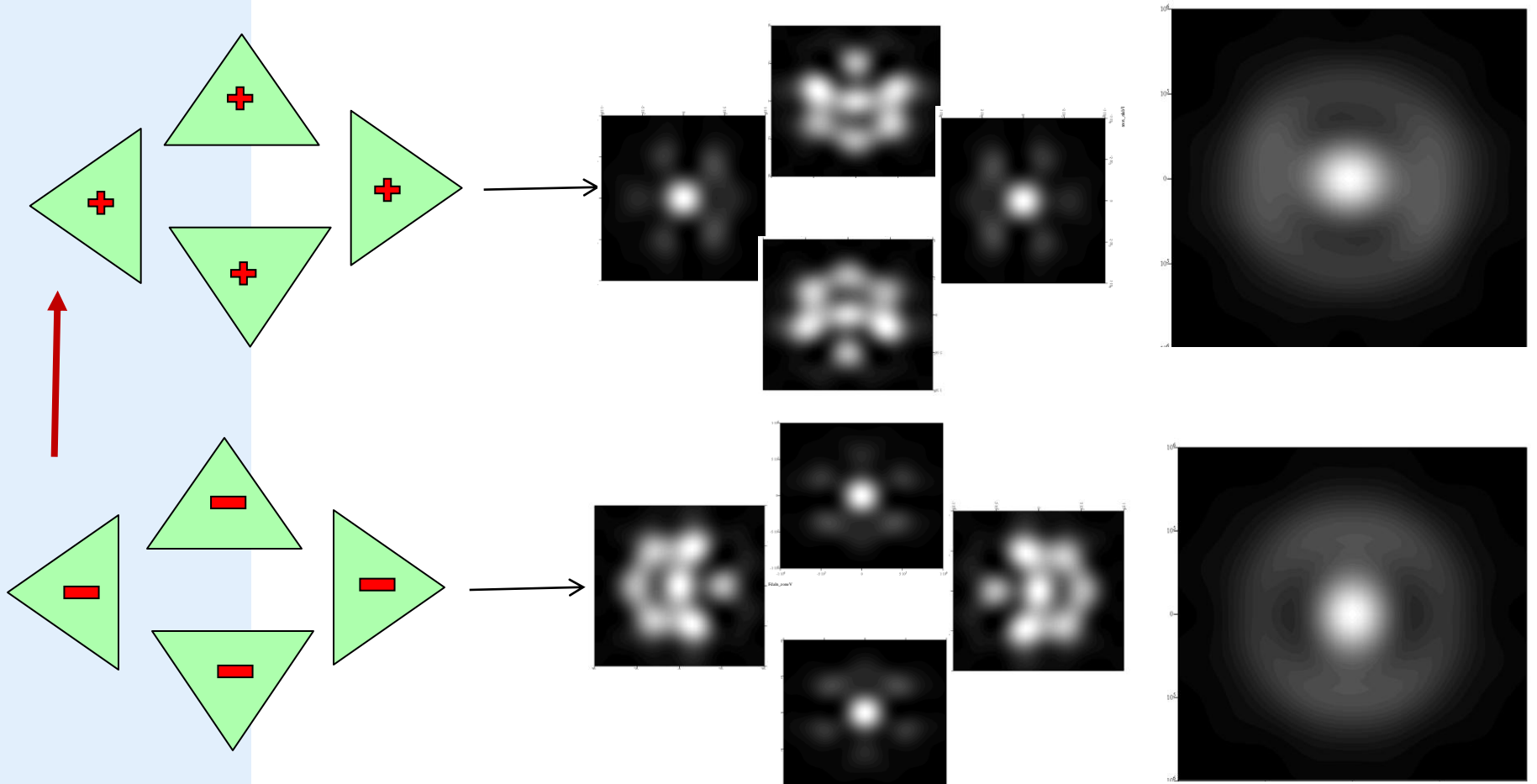| - 0,8"	- 0,8"	+ 0,8"	+ 0,8"	+ 0,8"	+ 0,8"	- 0,8"	- 0,8"

Formation of FFDP by 4 CCRs with DAO (+ and -)
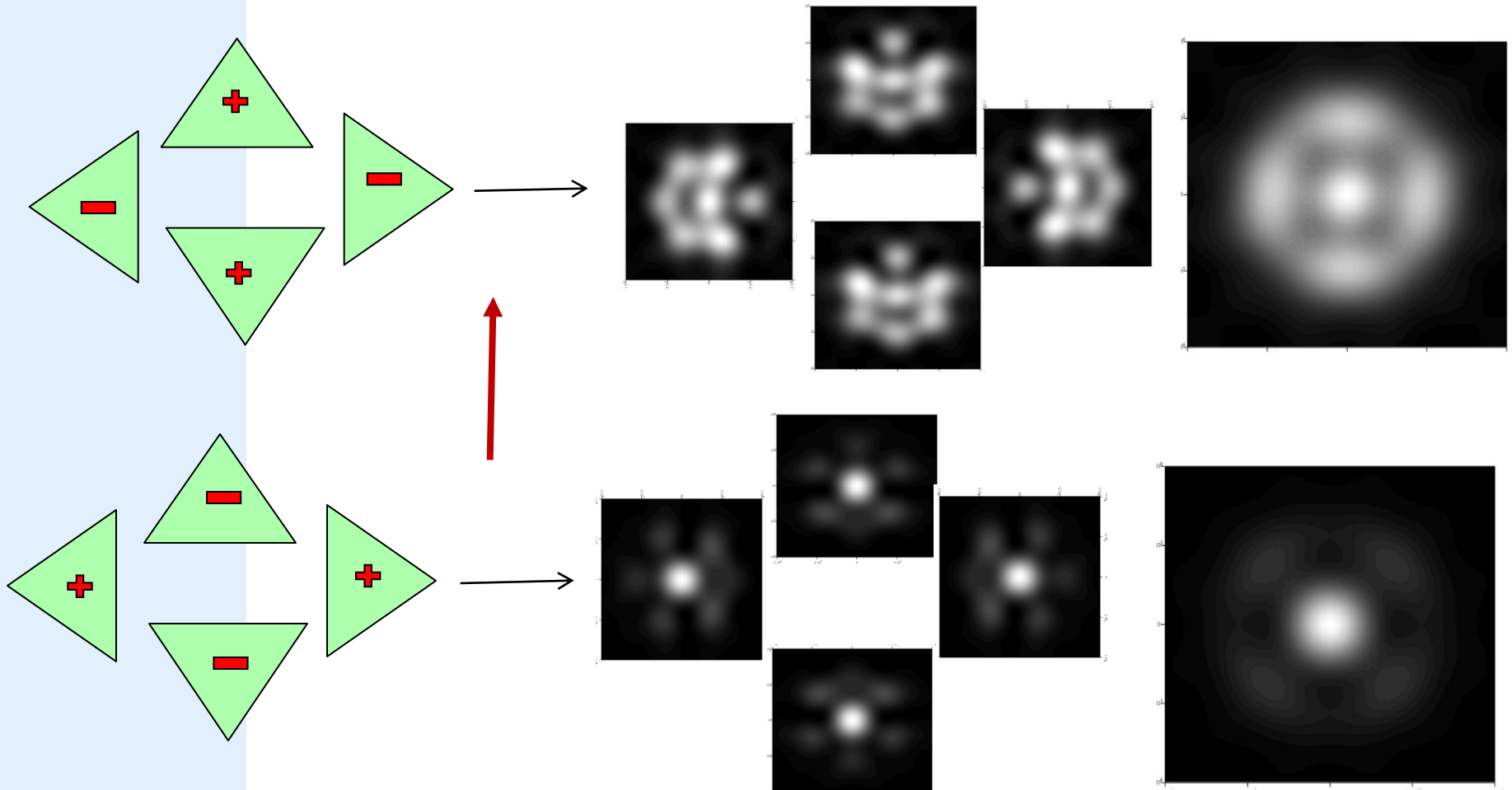
Formation of FFDP by 4 CCRs with DAO (+ and -) depending on polarization orientations
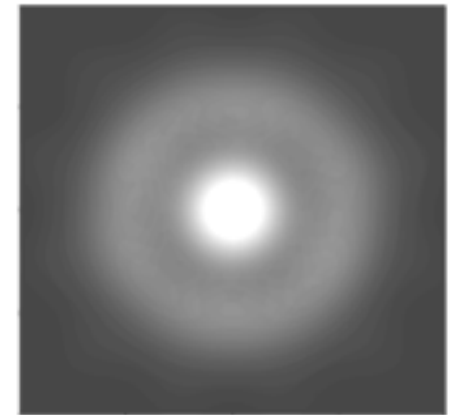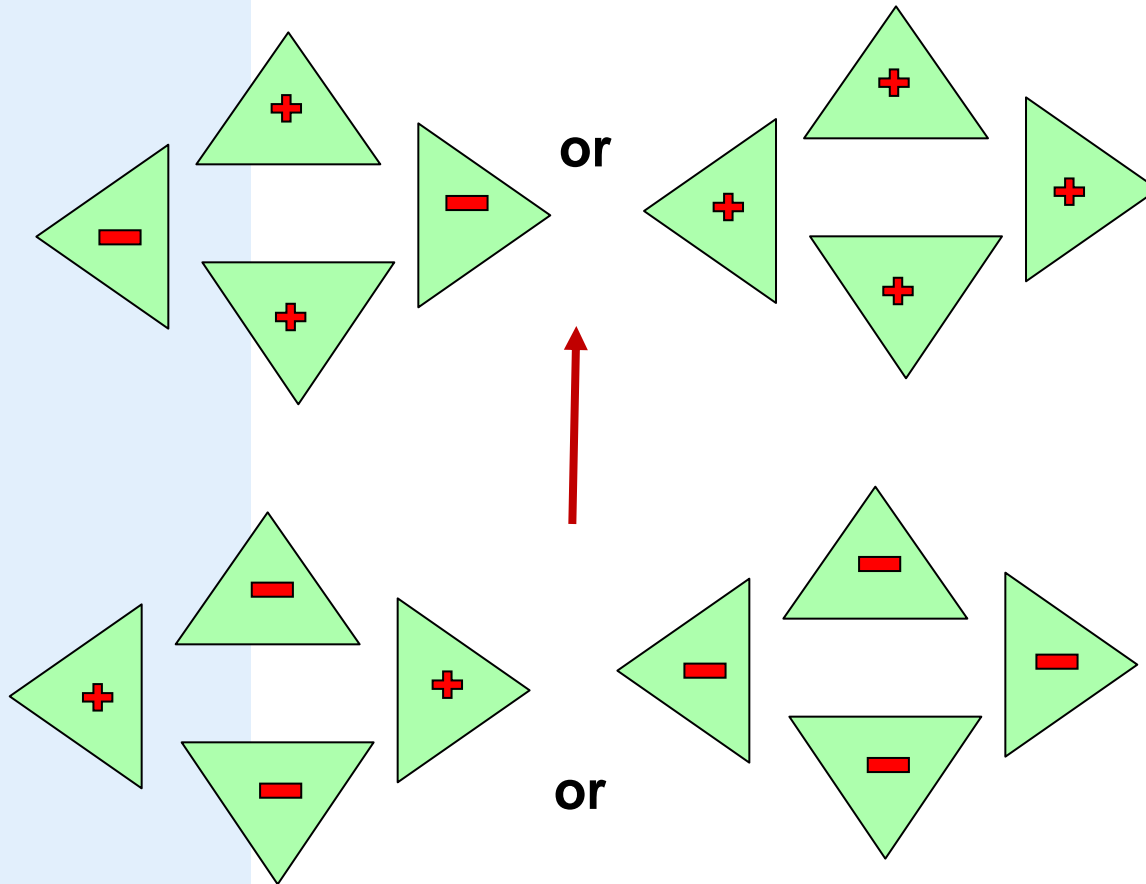
Formation of FFDP by 4 CCRs with DAO (+ or -)

Formation of FFDP by 8 CCRs with DAO, which is independent from polarization orientation
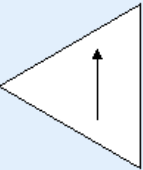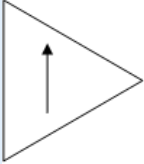
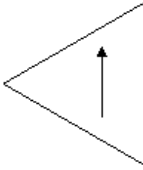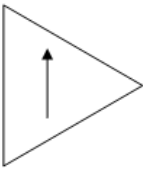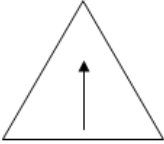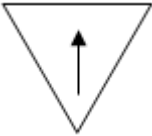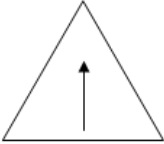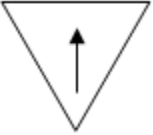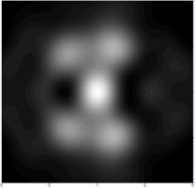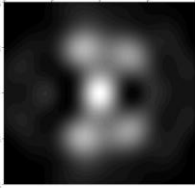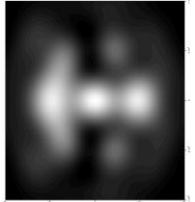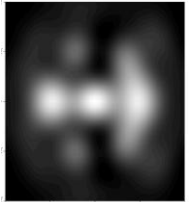**It is necessary to use equal quantity of CCR with different signs of DAO**

FFDP of CCR with symmetric DAOs of all angles,
(it is no a typical cause) Signs: plus and minus.

Value of the error is exaggerated

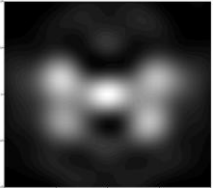| - 0,5"	- 0,5"	+ 0,5"	+ 0,5"	+ 0,5"	+ 0,5"	- 0,5"	- 0,5"

Formation of FFDP by 4 CCRs with symmetric DAO (it is no a typical cause)

Technique of flat LR-array production

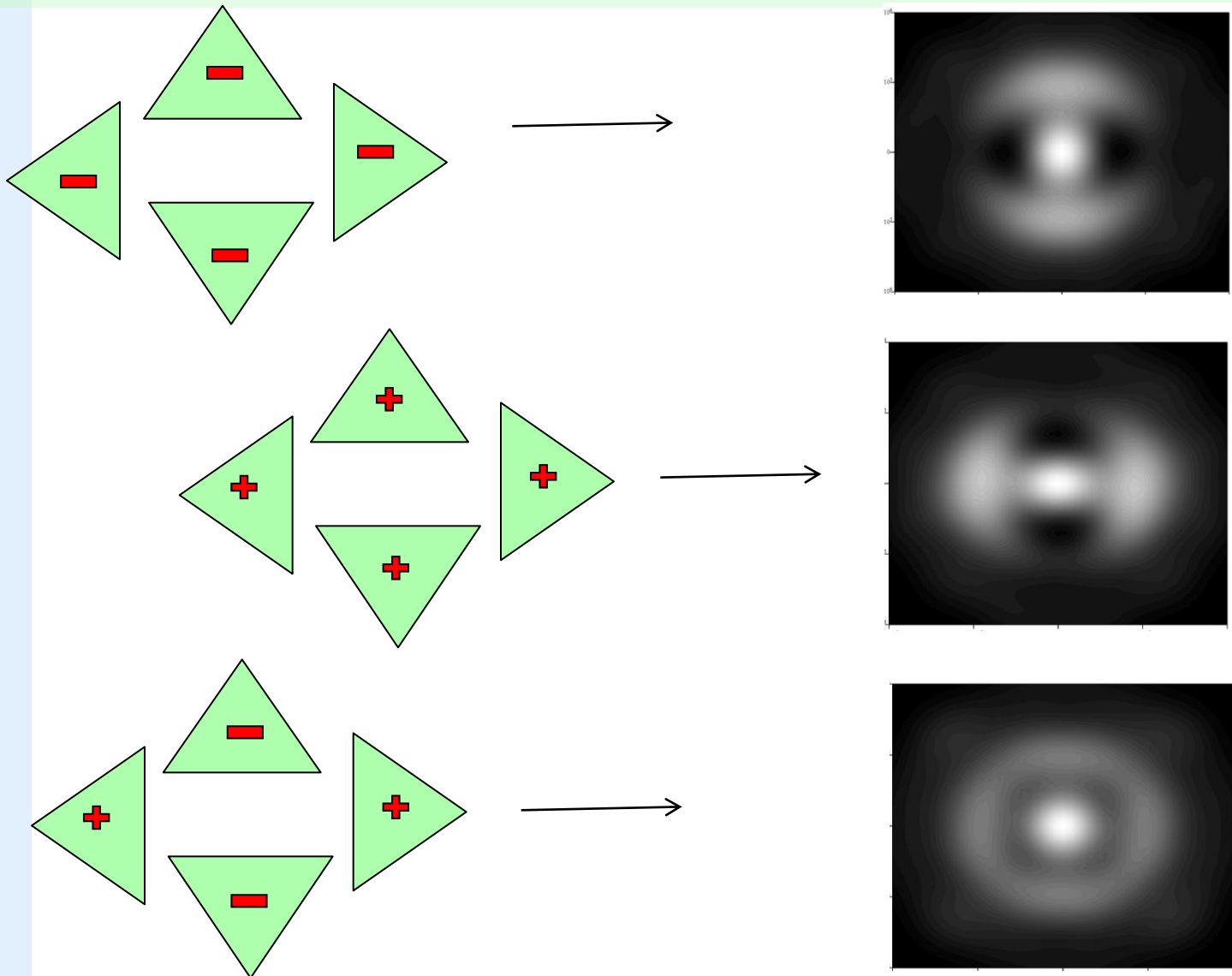1. Diagnosis of errors of CCR production according to the kind of error production and its sign.

2. Sorting of CCR with similar errors and selection of an equal quantity of CCR with different sign errors, which is a multiple of 4 (8).

3. Rotation of CCR with a similar kind and sign of an error in the array at an angle of 30° (15°).

Rotation of the same number of CCR with an error of the other sign. Or assembling 8 CCR as it is shown in slide 8.

Thank you for your attention!