1098-52-248 **Nikolai P. Dolbilin*** (dolbilin@mi.ras.ru), Gubkin street 8, Moscow, 119991, Russia. *Local Criteria for Regular Sets.*

A Delone (r, R)-set $X \subset \mathbb{R}^d$ is called *regular* if its symmetry group is transitive. Regular sets serve model of crystal. L.Pauling, R.Feynmann believed that long-range order in crystal comes out identity of patterns of nearby atoms.

In 1970's Delone initiated a problem to find link between local identity and global order, Dolbilin and Stogrin developed basics of local theory of crystals.

Given (r, R)-set $X, \rho > 0$, $\rho - cluster$ at point $x \in X$ is called set $X_x(\rho)$ of points $x' \in X$ s.t. $|xx'| \leq \rho$. Let $S_x(\rho)$ denote a group of $X_x(\rho)$ and $N_x(\rho)$ the number of classes of ρ-clusters in X.

We will discuss the following statements:

I. X is regular iff for some ρ s.t. two conditions hold:

(1) $N(\rho + 2R) = 1$; (2) $S_x(\rho) = S_x(\rho + 2R)$.

II. For $\forall\ \varepsilon > 0\ \exists$ set X s.t. $N(4R - \varepsilon) = 1$ but X is not regular.

III. If $N(2R) = 1$ and $X_x(2R)$ is centrally symmetrical about x then the X is centrally symmetrical about x.

IV. If $X \subset \mathbb{R}^3$, $N(10R) = 1$ then X is regular. (Received January 27, 2014)