MS21.01.05 THE SUPREME CRYSTALLOGRAPHY.
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From the definition of crystal as an arrangement of atoms that possesses a discrete group orthogonal transforms with a finite independent domain it follows that crystals can grow only in spaces of constant curvature, i.e. in Euclidean space (usual crystals), spherical space (fullerenes) and hyperbolic space (quasicrystals, Galiulin, Crystallography Reports, 1994, v.39, pp.517-521). The Supreme crystallography consider all three possibilities of crystal states of the matter. Two extra spaces are locally Euclidean, i.e. in small domains they are infinitesimally distinguishable from an Euclidean space. Therefore in the first stages of the growth the crystal can be formed according to any of three geometries. If its inner geometry not connect with geometry of the space the crystal stops in its growing when it reach some size and would remain in a nucleation stage. Probably, the mineralogical dust that, according to A.P.Khomjakov (Proceedings of the Russian Mineral. Soc. 1994, 123, N4, p.403) has become the main supplier of new mineral types, consists of particles of this kind. There will be discovered an infinity of such types since there are infinite number of space groups in spaces of constant non-zero curvatures.

If the inner geometry of a crystal is Euclidean, then, because of non-zero curvature of the space, dislocations are formed and the crystal brakes up into blocks. Crystal structures with non-Euclidean metrics can be separate morphologically. Concave, plane, or convex surface of dust particles might be an indicator of their origination from hyperbolic, Euclidean, and spherical spaces.

MS21.01.06 UNIFIED SYSTEM OF HERMANN-MAUGUIN SYMBOLS FOR GROUPS OF MATERIAL PHYSICS.
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A mathematically justified system of Hermann-Mauguin symbols of the following properties is proposed for groups of material physics:
1. It is based on the same principles as the traditional symbols for space groups.
2. Symbols of linear, frieze, plane, rod, layer, and space groups with discrete, continuous and semicontinuous lattices are included.
3. Each specific group is expressed with reference to a crystallographic basis by a single symbol with space shift in parentheses.
4. All possible settings and cell choices are described for monoclinic and orthorhombic groups.
5. The symbols of reducible space (plane) groups are correlated with symbols of rod and layer (frieze) groups through projections in which subperiodic groups appear as factor groups of reducible space groups.
6. Groups with standard symbols are chosen in each arithmetic class in such a way that they constitute a group under so-called Baer multiplication.

The system constitutes a background for a unified nomenclature of space and subperiodic groups up to three dimensions in which the relationship between reducible space groups and subperiodic groups is extremely transparent. The proposal is submitted to the Commission for Crystallographic Nomenclature. Proposed symbols of frieze, rod and layer groups will be used in Vol. E: "Subperiodic Groups" of the "International Tables for Crystallography". Relationships between groups will be illustrated by tables and diagrams and examples of the use of the system in applications will be demonstrated.

MS21.01.07 NUMBER AND SYMBOLS OF CRYSTALLOGRAPHIC POINT GROUPS OF FIVE-DIMENSIONAL SPACE.
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This is an addition and conclusion to the paper introduced during the IUCr XVI congress (Beijing 1993). A classification of the crystal families into geometrically Z reducible and geometrically Z irreducible families has been suggested as a result of both geometrical properties of their cells and different types of point symmetry operations [1], [2], [3]. For example, there are 29 gZ-red. and 3 gZ-irred. crystal families in space E^5. Each crystal family holohedry has been given a WPV (Weigel, Phan, Veysseyre) symbol [4] [5], generalizing the Hermann-Mauguin symbols. The family indexing has been achieved according to the decreasing number of the cell geometrical parameters.

By means of computer, all the subgroups of the different holohedries i.e. the crystallographic point groups of space E^5 has been listed.

The crystal family study having proved dissatisfactory as regards the working out of a logical link between all the point groups, it was necessary to go into all possible centerings of space E^5, hence to define "centered families" in connection with the previously defined families; the family VII splits into the the triclinic-hexagon R centered family (holohedry $\bar{\bar{3}}$, m) and the triclinic-hexagon family (holohedry $\bar{1}\perp 6mm$).

The definition of the WPV symbols has been achieved out of either algebraic properties of groups (direct product or semi-direct product) or the cell geometry (generator research belonging to supplementary orthogonal subspaces). These symbols should permit to list all point elements.Results about these point groups have been given showing the number of point groups of given orders or belonging to each family.

[1] T. Phan Thesis Paris VI 1989
[2] R. Veysseyre, D. Weigel and T. Phan *Acta Cryst* 1993 A49, 481-486
[3] Plesken W. Match 1981 n° 10 97-119
[4] D. Weigel, T. Phan and R. Veysseyre *Acta Cryst.* 1987 A 43, 294-304
[5] R. Veysseyre Thesis Paris VI 1987

PS21.01.08 VORONOI-NETWORKS.
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Any tesselation of the n-dimensional space by Dirichlet-domains of n- dimensional lattices defines an n-periodic connected graph by means of common vertices and edges of the polyhedra. These graphs, which characterize the tesselation, are called Voronoi-networks [1]. They are symmetric graphs, and resulting from their construction they show (at least) the symmetry of the Bravaisspace-group of the corresponding lattice type. These graphs can be described by quotient graphs [2] or by formal polynomials, the quotient polynomials [1]. A systematic derivation and description of those graphs using computer algorithms is given for the four dimensional case.

[1] Zimmermann, H.: On Voronoi-networks. ECM-15 Abstracts (1994), 201.
[2] Chung, S.J., Hahn, Th. & Klee, W.E.: Nomenclature and generation of three-periodic nets: the vector method, Acta Cryst. (1984). A40, 42-50.