# On groups with some subgroups complemented

**Carmine Monetta** (cmonetta@unisa.it)
University of Salerno, Italy

**Abstract.**  It is well-known that if a group has a family of subgroups satisfying the same property then one can grasp several information about the structure of the whole group (see for example [3, 4]). For instance, in a group of infinite rank the family of all subgroups of infinite rank has a strong influence on the group itself as showed in [1] and [2]. Recall that a group $G$ has finite rank $\rho(G) = r$ if every finitely generated subgroup of $G$ can be generated by at most $r$ elements and $r$ is the least positive integer with this property. If such an integer $r$ does not exist, then we say that $G$ has infinite rank.

The property we are mainly interested in is the complementation. We say that a subgroup $H$ of a group $G$ is complemented in $G$ if there exists a subgroup $K$ of $G$ such that $G = HK$ and $H \cap K = 1$. The subgroup $K$ is called a complement of $H$ in $G$. In [5] Hall proved that a finite group has every subgroup complemented if and only if it is supersoluble with elementary abelian Sylow subgroups.

The aim of this talk is to deal with some classes of infinite groups. Indeed, we will characterize two families of infinite groups in which some classes of subgroups are complemented, facing in particular the case of infinite rank groups.

# References

[1] A. Ballester-Bolinches, S. Camp-Mora, M. R. Dixon, R. Ialenti, F. Spagnuolo, *On Locally Finite Groups whose Subgroups of Infinite Rank have some Permutable Property*, Annali di Matematica Pura ed Applicata, **196** (2017), 1855-1862.

[2] A. Ballester-Bolinches, S. Camp-Mora, L. A. Kurdachenko, F. Spagnuolo, *On Groups whose Subgroups of Infinite Rank are Sylow permutable*, Annali di Matematica Pura ed Applicata, **195** (2016), 717-723.

[3] A. Ballester-Bolinches, X. Guo, *On Complemented Subgroups of Finite Groups*, Archiv der Mathematik, **72** (1999), 161-166.

[4] F. de Giovanni, C. Rainone, *Infinite Groups with many Generalized Normal Subgroups*, International Journal of Group Theory **1** (2012), 39-49.

[5] P. Hall, *Complemented groups*, J. London Math. Soc., **12** (1937), 201-204.