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Majdi BEN HALIMA

A brilliant mathematician turned off at early age

By Ali Baklouti

It is a tremendous honor to write this tribute to Majdi BEN HALIMA, an intimate Friend, Colleague, Teacher, Scholar and a Researcher. In whatever role I knew him, from whatever vantage

point, he stood apart as someone special! Majdi was committed to research focused on harmonic analysis and representation theory of Lie groups. He was passionate about finding new problems and enabling bridges between ideas and theories. In addition to his devotion to his work and to the improvement of research, he always found time for his colleagues, his friends, and his laboratory companions.

Majdi BEN HALIMA was born on June 24, 1979 in the city of Sfax. He achieved his undergraduate studies in Mathematics at the Faculty of Sciences of Sfax in 2002 with excellent grades. He was amended the first prize for graduating with excellence from the Ministry of Higher education, Scientific Research and Technology in Tunisia. He then moved to the University of Paul-Verlaine-Metz in France, where he obtained his Master degree in Mathematics in 2003, after he got a Tunisian Government scholarship for Master and doctoral studies in France. In 2006, he defended his PHD thesis entitled: "Invariant differential operators on homogeneous spaces: Branching rules and applications" under the supervision of Professor Tilmann Wurzbacher. Right after, he pursued his researches on similar problems, which include:

- Branching rules for compact Lie groups and spectra of invariant differential operators
- Construction of fuzzy homogeneous spaces and applications
- Orbit method for certain classical Lie groups and Lie subgroups.

In 2013, Majdi defended his Habilitation thesis at the Faculty of Sciences of Sfax, after having published several important articles. The list of his publications includes:

1. M. Ben Halima, Branching rules for unitary groups and spectra of invariant differential operators on complex Grassmannians, J. Algebra., **318** (2007), 520-552.
2. M. Ben Halima, Spectrum of the Hodge Laplacian on complex Grassmannian $Gr_2(\mathbb{C}^{m+2})$, Bull. Sci. Math., **132** (2008), 19-36.
3. M. Ben Halima, Spectrum of twisted Dirac operators on the complex projective space $\mathbb{P}^{2q+1}(\mathbb{C})$, Comment. Math. Univ. Carolin., **49** (2008), 437-445.
4. M. Ben Halima and T. Wurzbacher, Fuzzy complex Grassmannians and quantization of line bundles, Abh. Math. Semin. Univ. Hambg., **80** (2010), No. 1, 59-70.
5. M. Ben Halima, Construction of certain fuzzy flag manifolds, Rev. Math. Phys., **5** (2010), 533-548.
6. M. Ben Halima, Generalized Littlewood-Richardson rule and sum of coadjoint orbits of compact Lie groups, Bull. Sci. Math., **135** (2011), 345 -352.
7. M. Ben Halima and A. Rahali, On the dual topology of a class of Cartan motion groups, J. Lie Theory, **22** (2012), No. 2, 491-503.
8. M. Ben Halima and A. Rahali, Dual topology of the Heisenberg motion groups, Indian J. Pure. App. Math., **45** (2014), 513-530.
9. M. Ben Halima, Coadjoint orbits of certain motion groups and their coherent states, J. Nonlinear Math. Phys., **20** (2013), 420-430.

10. M. Ben Halima and A. Rahali, Separation of unitary representations of Euclidien motion groups, Not Mat., **35** (2015), 15-22.

11. M. Ben Halima and Massaoud Anis, Corwin-Greenleaf multiplicity function for compact extensions of $\mathbb{R}^n$. Int. J. Math., **26** (2015), No. 10.

Majdi was an active member of our Laboratory. He regularly attended our seminars and also participated in several international events. He was an inspiring figure of our department, his serious, deep thinking, and pretty quiet character made of him unanimously a best friend for the whole staff. He very often came to my office and we talked together about teaching, research, family, society problems and even some intimate issues. For what concerns mathematics, he was the brilliant theorist who made enduring contributions and inspired many researchers to pursue his alluring way. We did engage many regular discussions together about some problems related to visible actions on complex solvable homogeneous spaces and many preliminary results were obtained.

Following a first suggestion of mine, we co-supervised together the Phd thesis of Ayman Rahali, whose is at present an Assistant-Professor at the University of Kairouan. The defense ceremony turned on during the third Tunisian-Japanese conference on Geometric and Harmonic Analysis on Homogeneous spaces and Applications TJC3, hosted in Hammamet in 2013. The papers [7, 8, 10] follow from a fruitful collaboration, in which Majdi was the most perseverant engine.

He then started the supervision of the Phd thesis of the researcher Anis Massaoud, acting now as "Professeur-Agrégé" at the University of Gafsa and they published together the article [11] above. Majdi passed away on February 04, 2016, before the accomplishment of the project, after he fell sick from a severe disease. As Anis expressed his great enthusiasm, I was offered the immense honor to carry on the rest of this work. The publication [11] was as a starting milestone of a new issue in the theory of branching rules of unitary representations, and left behind many open problems, tackled by Anis in the next chapters of the thesis.

We will all have our own personal and proper memories, of the legacy he left in our hearts and our lives, and it is very hard for me today to be up here, imagining his alluring behavior, trying my best to focus on the glad memories Majdi brought to us, rather than the fact that he is no longer here with us today. I do offer my heartfelt respects upon the passing of the talented scientist, to his grieving family, all harmonic analysts worldwide and the scientific community.