

# Scientific report

Dr Rezki CHEMLAL.

Laboratoire de Mathématiques Appliquées, Bejaia University.  
rchemlal@gmail.com / rezki.chemlal@univ-bejaia.dz

During the year 2022 I received a grant from IMU for a visit to the University of Santiago Chile.

We showed that the set of strictly temporally periodic points of cellular automata with almost equicontinuous points according to Gilman's classification [1] is dense in the topological support of the measure. This extends a result of Lena, Margara and Dennunzio [2] to a larger class. A publication was submitted on august 25.

We didn't obtain any significant result on irrational eigenvalues of cellular automata this question was the original main goal of the visit. The only promising idea is to study what we decided to call roots of the shift i.e. cellular automata with the property  $F^p = \sigma$ . After some initial simulations done in cooperation with my Ph.D. student it seems that this category of cellular automata exhibits some interesting properties. But by now we are at early stages of the work.

In the field of modeling in social sciences, we finished a work on a language shift model using partitioned cellular automata. This model is designed for the case of Algeria. We studied the dynamical properties of this model. The results are at the writing stage.

We didn't advise jointly Ph.D. students in a formal way however we did provide some advises to a local Ph.D. student during lunch time and informal discussions.

We didn't have nor do plan activities outside the research plan mainly because Pr Alejandro Maas was already busy doing administrative local tasks and teaching.

However this may happen as Pr Alejandro Maas already participated this year to a workshop we organized in Algeria:

<https://ratds22.sciencesconf.org/>

I benefited from the seminar of CMM where many European colleagues where visiting the CMM at the same period I was there. I want to thank Pr Alejandro Maas for the invitation and the many fruitful discussions.

I am really grateful to IMU for the grant. The visit was a success; it helped me to finish many projects I started but that where running at a slow pace and with multiple discontinuities when I was in Algeria.

[1] R.H. Gilman. Classes of linear automata. Ergodic Theor. Dynam. Sys., 7 (1987), 105-118.

[2] P.Di Lena, L.Margara and A.Dennunzio, Strictly Temporally Periodic Points in Cellular Automata, Automata and JAC, 2012.