A discrete 2D-modelization for Goldbach's conjecture, Denise Vella-Chemla, mars 2026

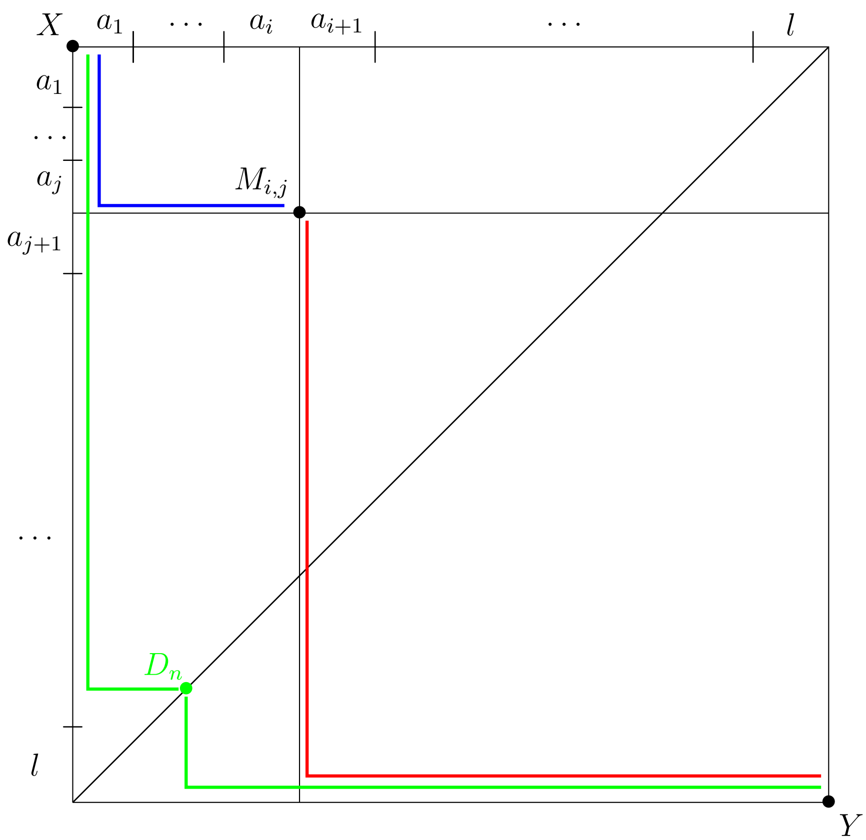
We would like to use the above modelization to try to prove Goldbach's conjecture.

The Goldbach's conjecture can be stipulated as :

"*Every even number (>4) is the sum of two odd prime numbers.*[1]

What we have to prove using this modelisation is :

> "*There is always a point D_n at equal distance from X and Y, i.e. that is such that $f(D_n) = 0$ with f the function defined below the diagram.*" (Lines are not positioned exactly to improve readability).



We define a function $f(M)$ for the vertex M, that calculates the difference between the Manhattan distance between M and Y and the Manhattan distance between M and X as :

$$\begin{aligned} f(M_{ij}) &= |A| - |B| \\ &= \left(\sum_{k=i+1}^{l} a_k + \sum_{k=j+1}^{l} a_k \right) - \left(\sum_{k=1}^{i} a_k + \sum_{k=1}^{j} a_k \right) \end{aligned}$$

1. Examples of "my squares" associated to n from 6 to 102 can be found here : https://denisevellachemla.eu/touscarrespourdg.pdf.

What knowledge have we?

1) n is an even number > 4;
2) $\sum_{k=1}^{l} a_k = n$;
3) $\forall i, 1 \leqslant i \leqslant l-1, \quad \sum_{k=1}^{i} a_k$ is an odd prime number;
4) a_l is odd and $a_l \geqslant 3$;
5) $a_2, \ldots, a_{l-1}$ are even numbers $\geqslant 2$;

With all those definitions, Goldbach's conjecture is equivalent to

"*There exists a point D_n in our set such that $f(D_n) = 0$*".

(We would like, if it is possible, to use a lemma from Tucker (1946)).