



Laboratoire d'Annecy de Physique des Particules

Optimisation : Barycentre

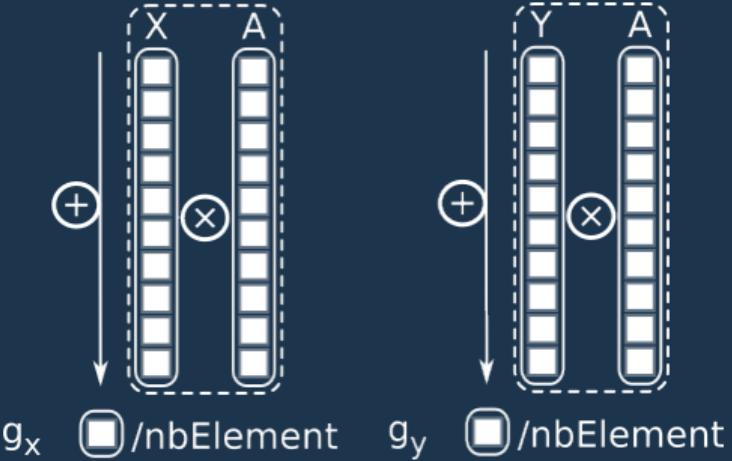
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The Barycentre 2d

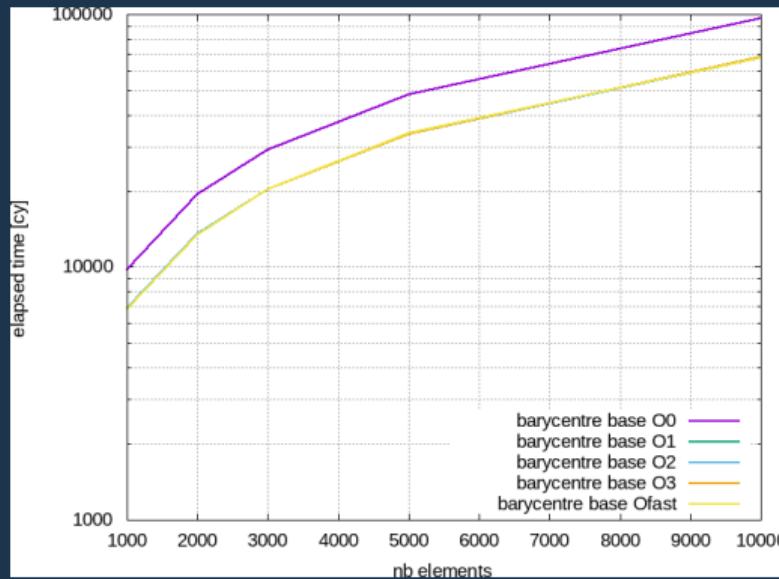
$$(g_x, g_y) = \frac{1}{N} \sum_{i=1}^N (x_i, y_i) \cdot a_i$$



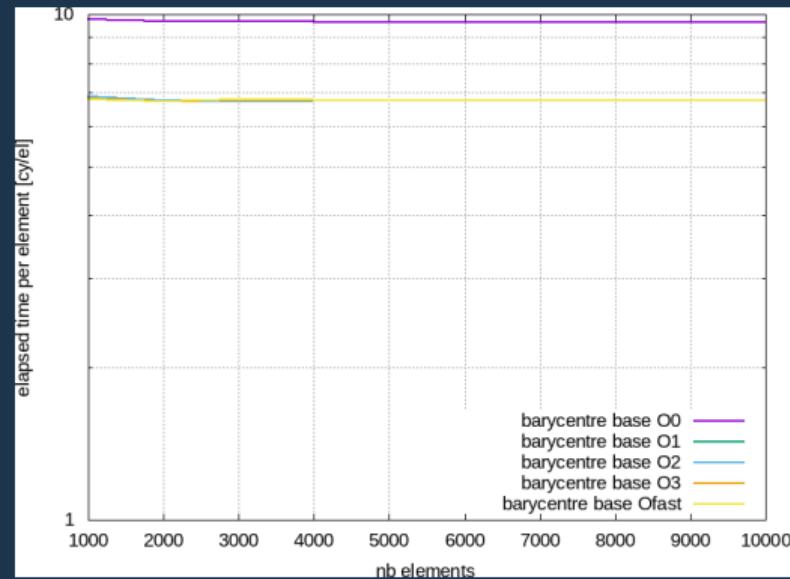
```
void barycentre(float & gx, float & gy, const float * tabX, const float* tabY, const float* tabA, long unsigned int nbElement){
    gx = 0.0f;
    gy = 0.0f;
    for(long unsigned int i(0lu); i < nbElement; ++i){
        gx += tabX[i]*tabA[i];
        gy += tabY[i]*tabA[i];
    }
    gx /= (float)nbElement;
    gy /= (float)nbElement;
}
```

The barycentre : performances

Total Elapsed Time (cy)

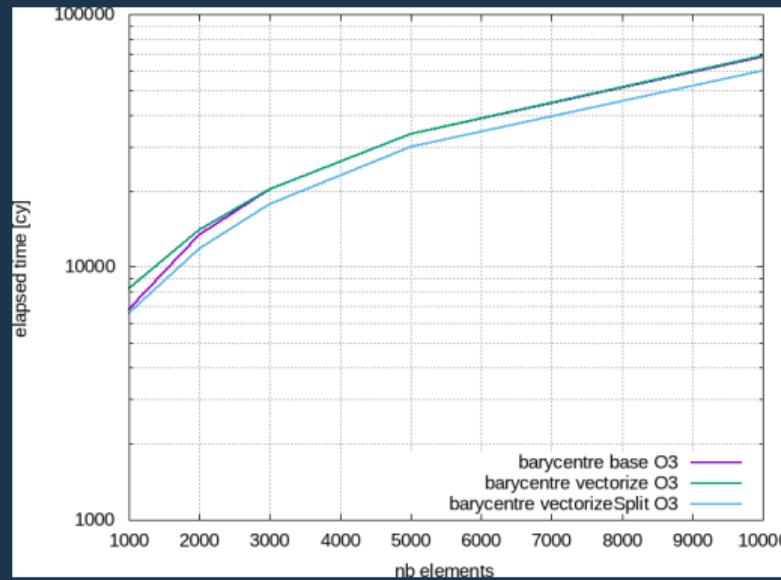


Elapsed Time per element (cy/el)

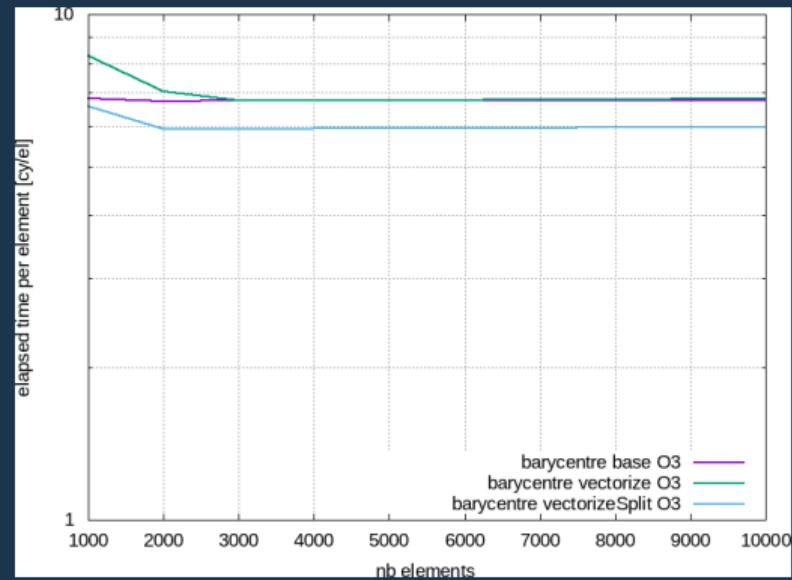


The barycentre : vectorize

Total Elapsed Time (cy)

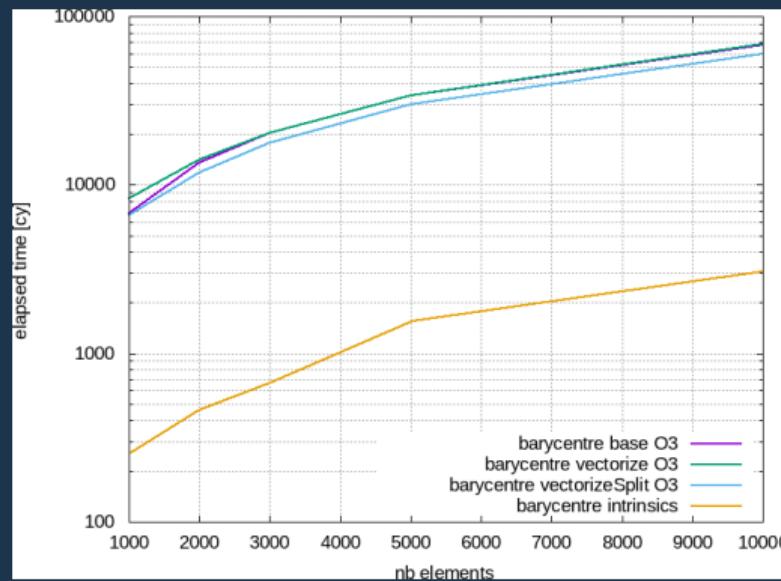


Elapsed Time per element (cy/el)

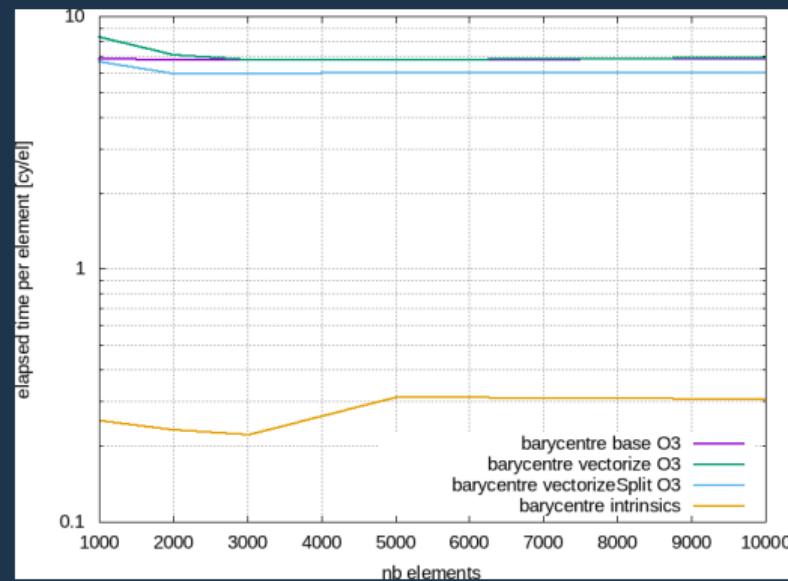


The barycentre : intrinsics

Total Elapsed Time (cy)



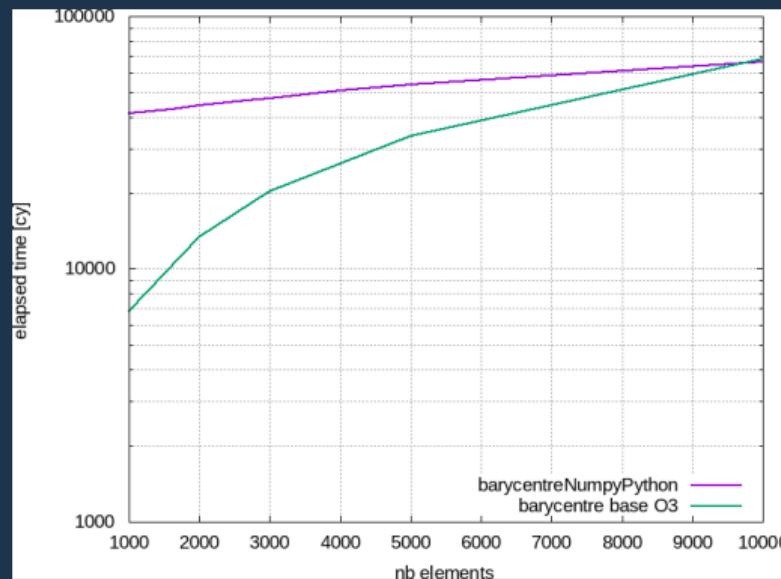
Elapsed Time per element (cy/el)



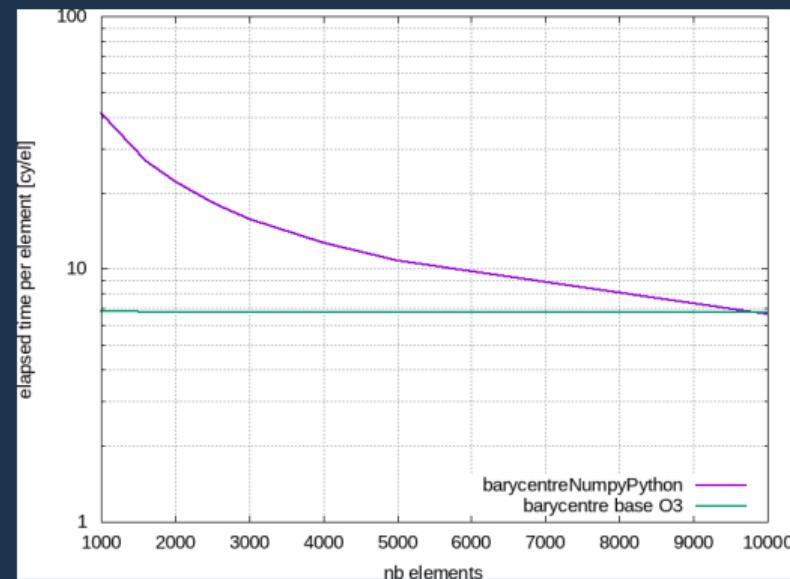
2000 elements, Intrinsics is **28** times faster than -Ofast vectorized

The barycentre : Python

Total Elapsed Time (cy)



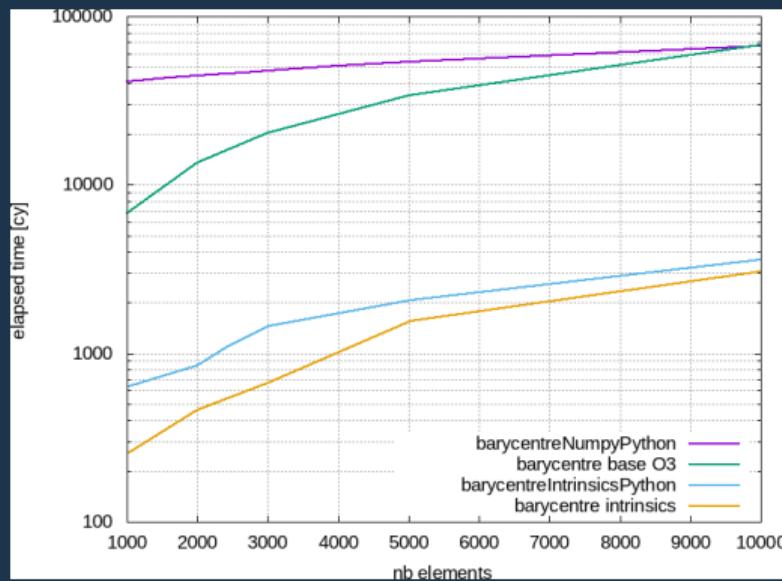
Elapsed Time per element (cy/el)



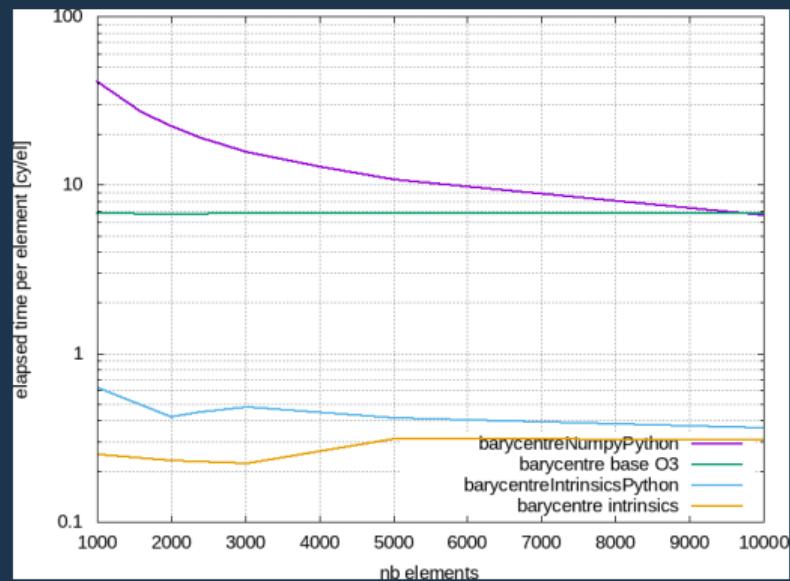
1000 elements, C++ O3 version is **5.7** times faster than **numpy** version

The barycentre : Python summary

Total Elapsed Time (cy)



Elapsed Time per element (cy/el)



1000 elements, our python version is **53** times faster than **numpy** version