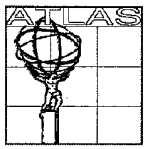
Magnetic field software requirements

(for the muon reconstruction in the spectrometer)

1/ Muon reconstruction in the spectrometer

2/ Magnetic field

3/ C++ propositions

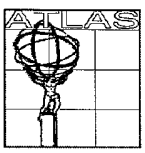


1/ Muon reconstruction in the spectrometer

- **~ 650 000 calls to b-field / recons. muon**
  - → to get the nominal efficiency and resolution
  - → one muon reconstruction take ~3.3 seconds (J.F. Laporte 6/5)
    - → ~33% b-field
    - → ~33% tracking
    - → ~33% pattern + fits

2/ Magnetic field

- **b-field anywhere in muon spectrometer**
  - → must be accessed in a very short time
  - =>interpolation algorithms with a minimum of test e.g. 3D linear interpolation with calculation of pointers
  - fortran reference code: 1.7 10^{-6} seconds / call
  - → in spite of the highly inhomogeneous b-field, size of the b-field map must remain reasonable
  - => highly non regular grid
  - at present 770000 pts, 4Mb for 1/16 of the total volume of the spectrometer



3/ C++ propositions (cont.)

- **babar,d0,(geant-4)**

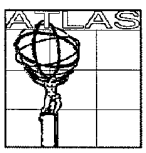
  =>virtual b-field class

  → b-field everywhere quickly with certain accuracy (inherit)

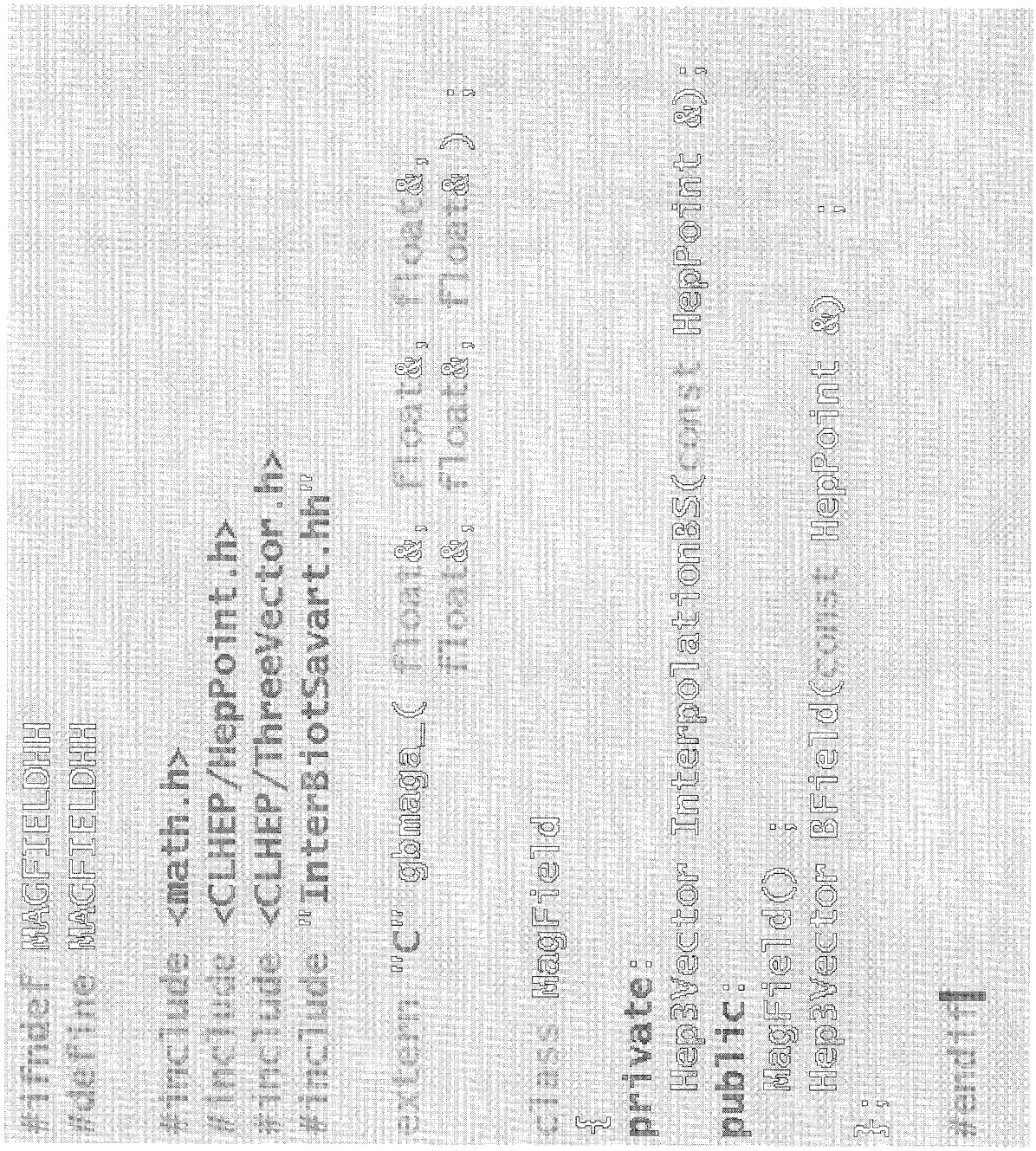
  → b-field somewhere more slowly with high accuracy (inherit)

  → b gradient (inherit)

  → ...



3/ C++ propositions



```
#ifndef MAGFIELDHH
#define MAGFIELDHH

#include <math.h>
#include <CLHEP/HepPoint.h>
#include <CLHEP/ThreeVector.h>
#include "InterBiotSavart.hh"

extern "C" gbmaga_( float&, float&, float&, float&, float& ) ;

class MagField
{
private:
  Hep3Vector InterpolationBS(const HepPoint &);
public:
  MagField() ;
  Hep3Vector BField(const HepPoint &) ;
};

#endif
```