

```
/*c128*/case 3: {c(Vd)a=Rd(p,0),b=Rd(p,1);r=unpack_Vz(a,b);break;}  
/*c64*/case 4: r=unpack_Vf(Rf(p,0));break;  
/*c32*/default: r=Z2(Zd,Zd);break;  
};r),c(i32)t,c(void)*p)
```

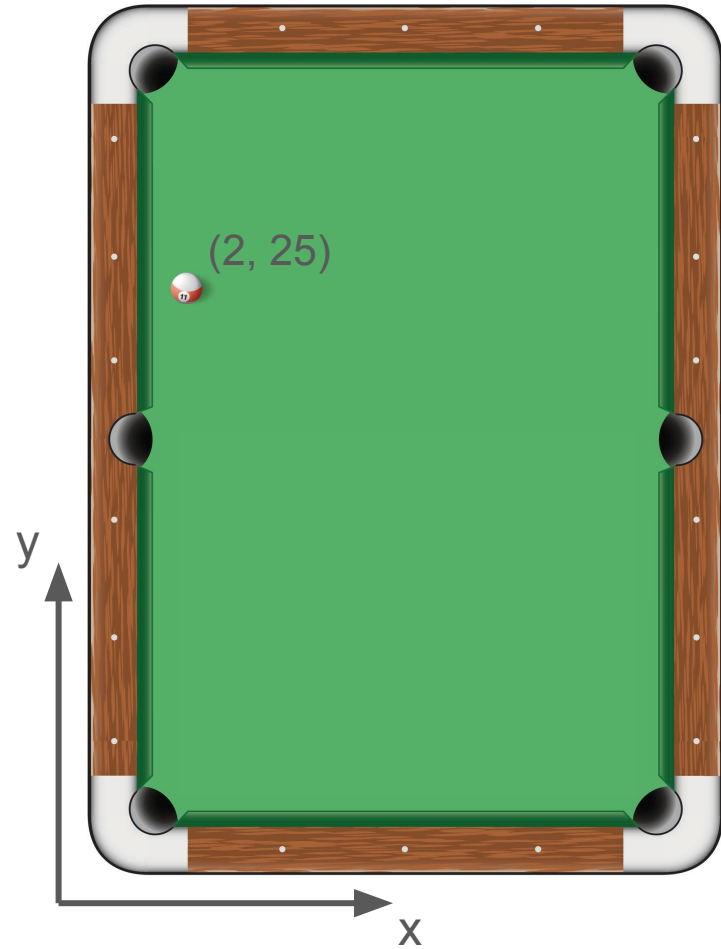
Applications of novel programming languages and compilation techniques to accelerating quantum many-body science

Tom Westerhout

```
proc LogDebug(msg...) {  
  try! stderr.writeln(  
    "[Debug]  ["", here, ""], "", (...msg))": } }
```

```
compensatedPlus : Num a => a -> a -> a -> ( # a, a # )  
compensatedPlus t c de = ( # t', c' # )  
where de' = de + c; t' = t + de'; c' = de' - (t' - t)
```

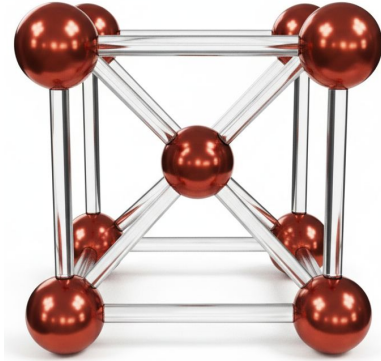
Classical mechanics



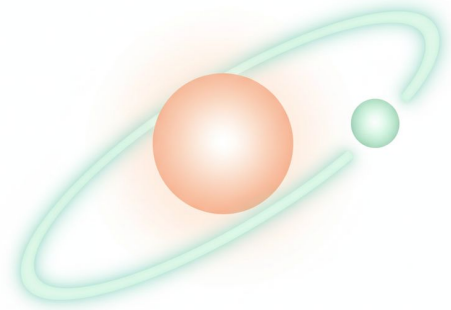
Quantum



Stainless steel pan

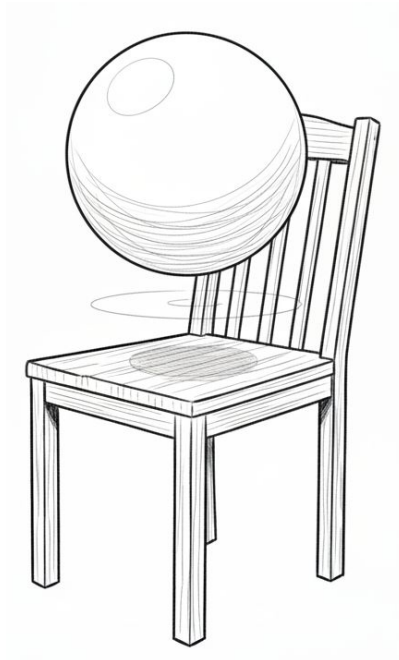


Iron atoms

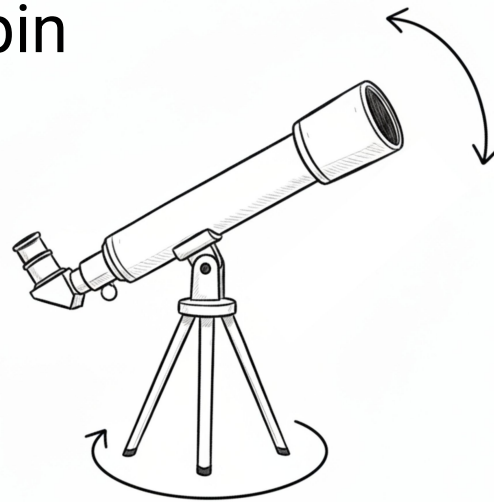


Hydrogen atom

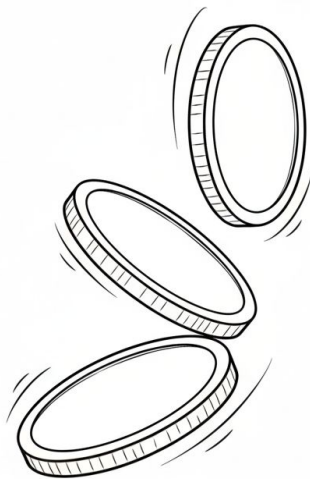
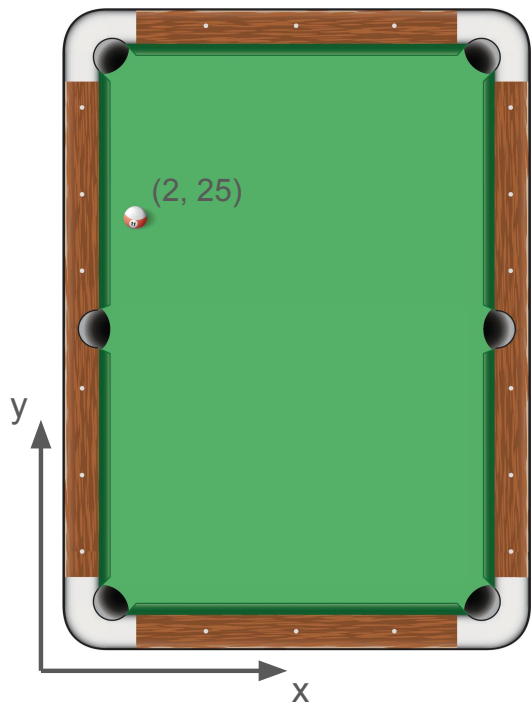
Electron



Spin

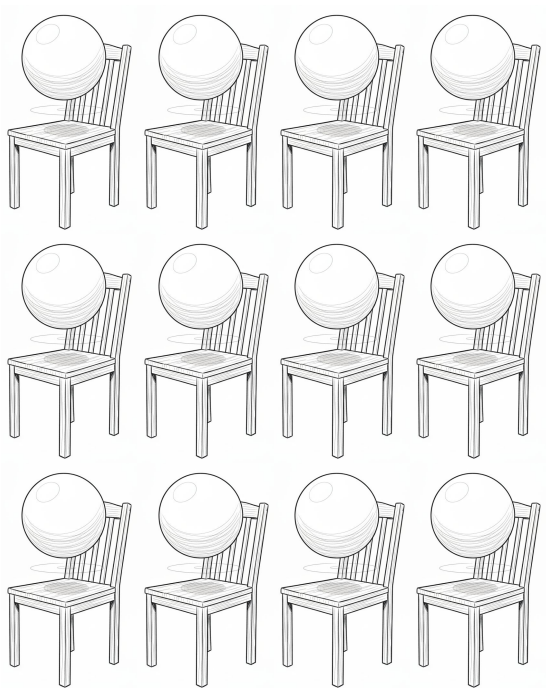


2 angles

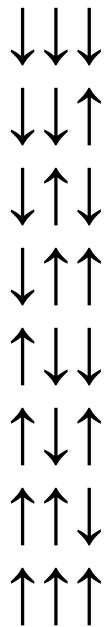


Heads or tails

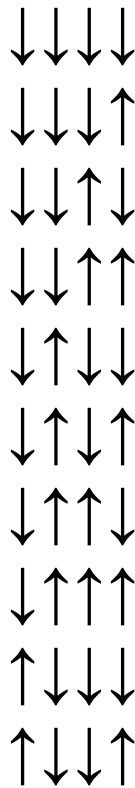
Probability of heads & tails



4



8

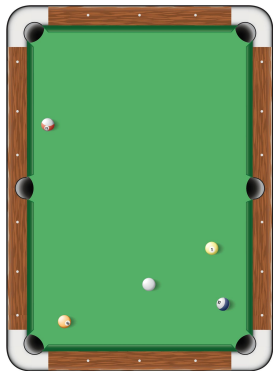


...

16

4096

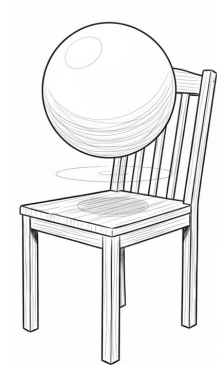
Classical



+2

2, 4, 6, 8, 10, 12, 14, ...

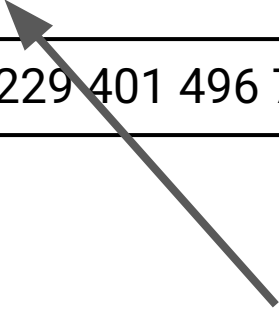
Quantum



×2

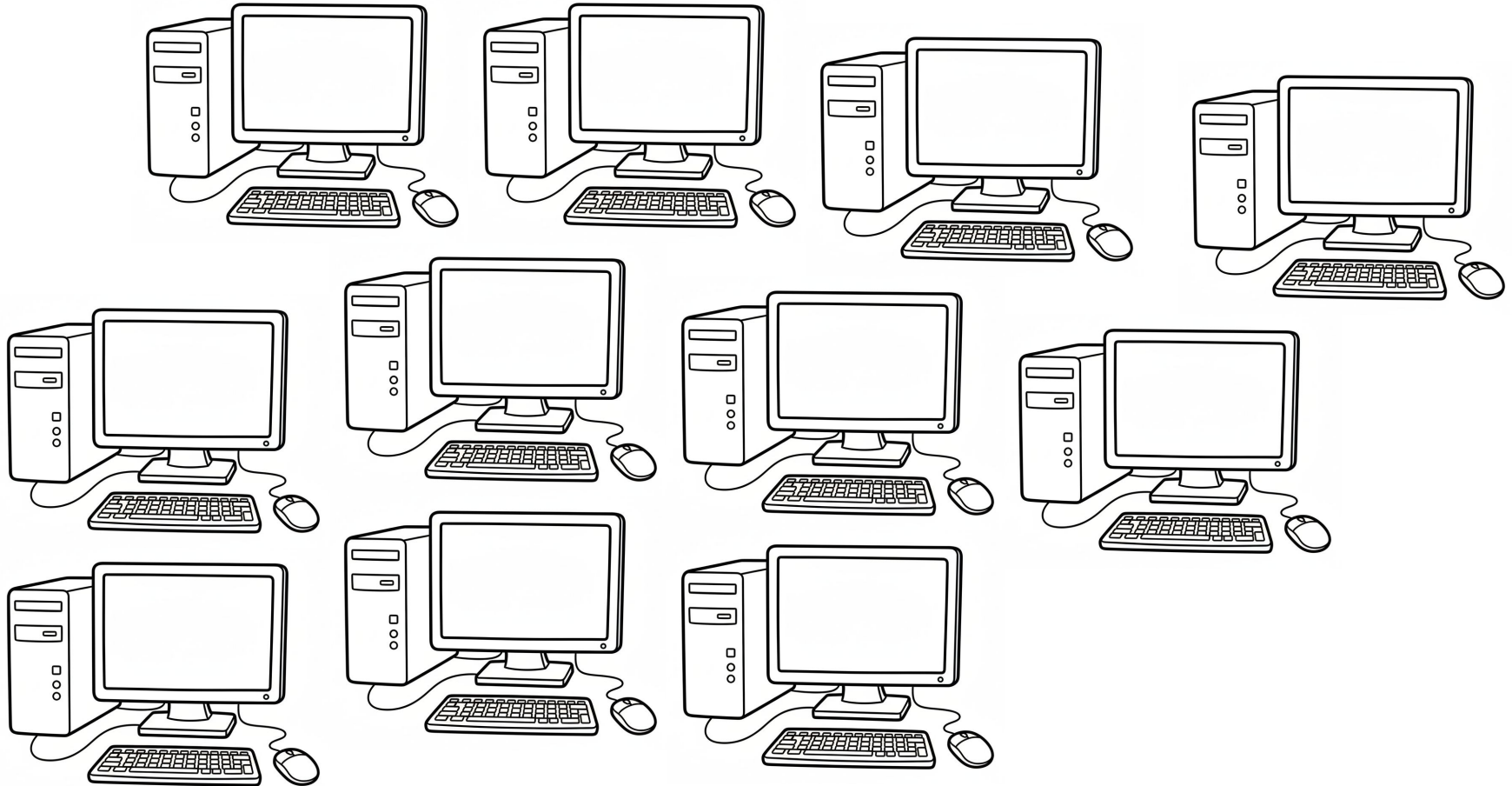
2, 4, 8, 16, 32, 64, 128, ...

Pool balls / Spins	Classical	Quantum
1	2	2
5	10	32
20	40	1 048 576
43	86	8 796 093 022 208
100	200	1 267 650 600 228 229 401 496 703 205 376



ChatGPT
/ Gemini
/ Claude

High performance computing



Computer¹⁰⁰
¹⁰
¹⁰¹ Science₁₁₀₁₀ + Physics = My PhD¹¹

