```
SetDirectory["C:/drorbn/AcademicPensieve/2009-02/"];
<< KnotTheory`
```

Loading KnotTheory` version of January 20, 2009, 18:22:51.4144.
Read more at http://katlas.org/wiki/KnotTheory.

```
Switch[Online,
  Online, ideal = Import["http://katlas.org/w/images/5/5a/IdealLinks.txt.gz", "String"],
  Offline, ideal = Import["C:\\drorbn\\People\\Gilbert\\idealLinks.txt", "String"]
]
```

A very large output was generated. Here is a sample of it:

```
<DATA Title="Database of Ideal links"
    Author="Brian Gilbert" Date="1/02/2009 7:59:26 p.m.">

<HL Id="L2a1" Conway="2" D=" 1.000000">

<STRING I="1" L=" 6.283185">

  <Coeff I="  0" A="-1.000000, 0.000000, 0.000000" B=" 0.000000, 0.000000, 0.
 … " 0.000022,-0.000074,-0.000002" />

  <Coeff I=" 28" A=" 0.000030,-0.000105,
    0.000014" B=" 0.000014, 0.000051, 0.000023" />

  <Coeff I=" 29" A=" 0.000002,
    0.000068, 0.000034" B="-0.000016, 0.000023,-0.000006" />

</STRING>

</HL>

</DATA>
```

| Show Less | Show More | Show Full Output | Set Size Limit... |

```
Length[
 data = Cases[ImportString[ideal, "XML"], XMLElement["HL", hl___] :> HL[hl], Infinity]
]
```

130

```
ProcessHL[hl_HL] := Module[
    {Id, CS, L, strands, rls, ips, coeffs},
    {Id, CS} = {"Id", "Conway"} /. hl[[1]];
    L = Link[Id];
    ConwayString[L] = CS;
    strands = Cases[hl, XMLElement["STRING", s___] :> Strand[s], Infinity];
    rls = ips = {};
    (
       rl = ToExpression["L" /. #[[1]]];
       ip = FourierData @@ #[[2]] /. XMLElement["Coeff", l_List, {}] :> {
            ToExpression["I" /. l],
            ToExpression["{" <> ("A" /. l) <> "}"],
            ToExpression["{" <> ("B" /. l) <> "}"]
          };
       AppendTo[rls, rl];
       AppendTo[ips, ip]
      ) & /@ strands;
    RopeLength[L] = rls;
    IdealPresentationData[L] = ips;
    L
  ];
IdealPresentation[L_Link][t_] := IdealPresentationData[L] /. {
    {i_, A_List, B_List} :> If[i == 0, 1/2 A Cos[i t], A Cos[i t] + B Sin[i t]]
   } /. FourierData -> Plus

Ls = Union[ProcessHL /@ data];

Max[RopeLength /@ Ls]
```

30.7337

```
l = Length[Ls]
```

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```
Clear[DrawLink];
RandomUnitVector[] := (
   v = {Random[], Random[], Random[]};
   v / Sqrt[v.v]
 );
RandomColor[] := RGBColor @@ RandomUnitVector[];
DrawLink[L_Link] := DrawLink[L] = ImageCrop[Rasterize[
     Graphics3D[
       nc = Length[RopeLength[L]];
       basehue = Random[];
       Table[
        {
         Specularity[0.7, 40 Random[]],
         Hue[basehue + c / nc],
         Glow[Hue[basehue + c / nc, 1, 0.25]],
         {X1, X2, X3} = Compile[{t}, #] & /@ IdealPresentation[L][t][[c]];
         T = 8 RopeLength[L][[c]];
         Tube[
          Table[{X1[2 Pi k / T], X2[2 Pi k / T], X3[2 Pi k / T]}, {k, 0, T}], 0.1 + 0.4 Random[]]
        },
        {c, nc}
       ],
       Boxed → False, Background → Black, ImagePadding → None,
       PlotRangePadding → 0,
       ViewPoint → 20 RandomUnitVector[],
       Lighting → {
         {"Directional", Hue[Random[]], RandomUnitVector[]},
         {"Point", Hue[1], 3 Random[] RandomUnitVector[]}
        }
      ],
      ImageSize → 400, RasterSize → 400, Background → Black
    ]];
```

```
SeedRandom[1]; scale = 250; textsize = Round[13 scale / 72 / 2];
im = ImageAssemble[{
    {Rasterize[GraphicsGrid[
        Partition[DrawLink /@ Ls, 13],
        Background → Black, Spacings → 0
      ], ImageSize → scale {13, 10}, RasterSize → scale {13, 10}, Background → Black]},
    {
     Rasterize[
      Graphics[{Yellow, Text[Style[
          Column[{
            "Loop Soup by Dror Bar-Natan (2009) based on data by Brian Gilbert;
              http://www.math.toronto.edu/~drorbn/Gallery/KnottedObjects/LoopSoup/",
            "(technically, these are minimal rope-length presentations of
              all prime links with up to 9 crossings)"
           }, Center
          ], textsize
        ]]}],
      ImageSize → {13 scale, 3 textsize},
      RasterSize → {13 scale, 3 textsize}, Background → Black
     ]
    }
  }];
Show[ImageResize[im, 720]]
```
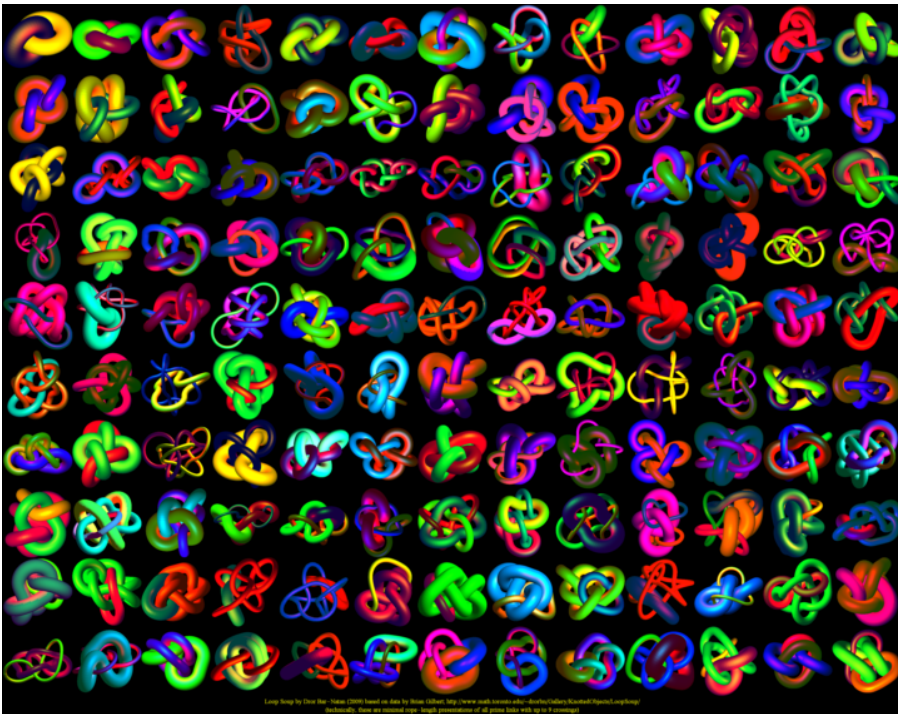


```
Export["LoopSoup.png", im];
Export["LoopSoup_720.png", ImageResize[im, 720]];
Export["LoopSoup_120.png", ImageResize[ImageTake[im, 250 * 3, 250 * 4], 120]];

textsize
```

45

```
 textsize = Round[13 scale / 72 / 2];
Rasterize[
 Graphics[{Yellow, Text[Style[
      Column[{
         "Loop Soup by Dror Bar-Natan (2009) based on data by Brian Gilbert;
           http://www.math.toronto.edu/~drorbn/Gallery/KnottedObjects/LoopSoup/",
         "(technically, these are minimal rope-length presentations of
           all prime links with up to 9 crossings)"
        }, Center
       ], textsize
      ]]}],
 ImageSize -> {13 scale, 3 textsize},
 RasterSize → {13 scale, 3 textsize}, Background → Black
]
```


{13 scale, 3 textsize}

{3250, 135}

135 / 3250 // N

0.0415385

30 / 720 // N

0.0416667