

```

(** Data import **)
SetDirectory [NotebookDirectory []];
NamDataRhoLCD = Import["OutputLCD.txt", "Table"];
NamDataRhoDesticky = Import["OutputWP.txt", "Table"];
Fidelity[Rho1_, Rho2_] :=
  Re[Tr[MatrixPower [MatrixPower [Rho1, 1/2].Rho2.MatrixPower [Rho1, 1/2]], 1/2]]^2

(* Ideal GHZ state rho matrix *)
RhoIdealRe = .5 {{1, 0, 0, 0, 0, 0, 0, 0, 1}, {0, 0, 0, 0, 0, 0, 0, 0, 0},
  {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0},
  {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}, {1, 0, 0, 0, 0, 0, 0, 0, 1}};
RhoIdealIm = {{0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0},
  {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0},
  {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}};
RhoIdeal = RhoIdealRe + RhoIdealIm;

(*LCd*)

RhoLCDRe = Table[NamDataRhoLCD [[i]], {i, 2, 9}];
RhoCDIm = Table[NamDataRhoLCD [[i]], {i, 13, 20}];
Dimensions [RhoLCDRe]
Dimensions [RhoCDIm]
{8, 8}
{8, 8}

RhoLCD = RhoLCDRe + I * RhoCDIm ;
Fidelity[RhoLCD, RhoIdeal]
0.936216

(* Reconstructed matrix plot *)

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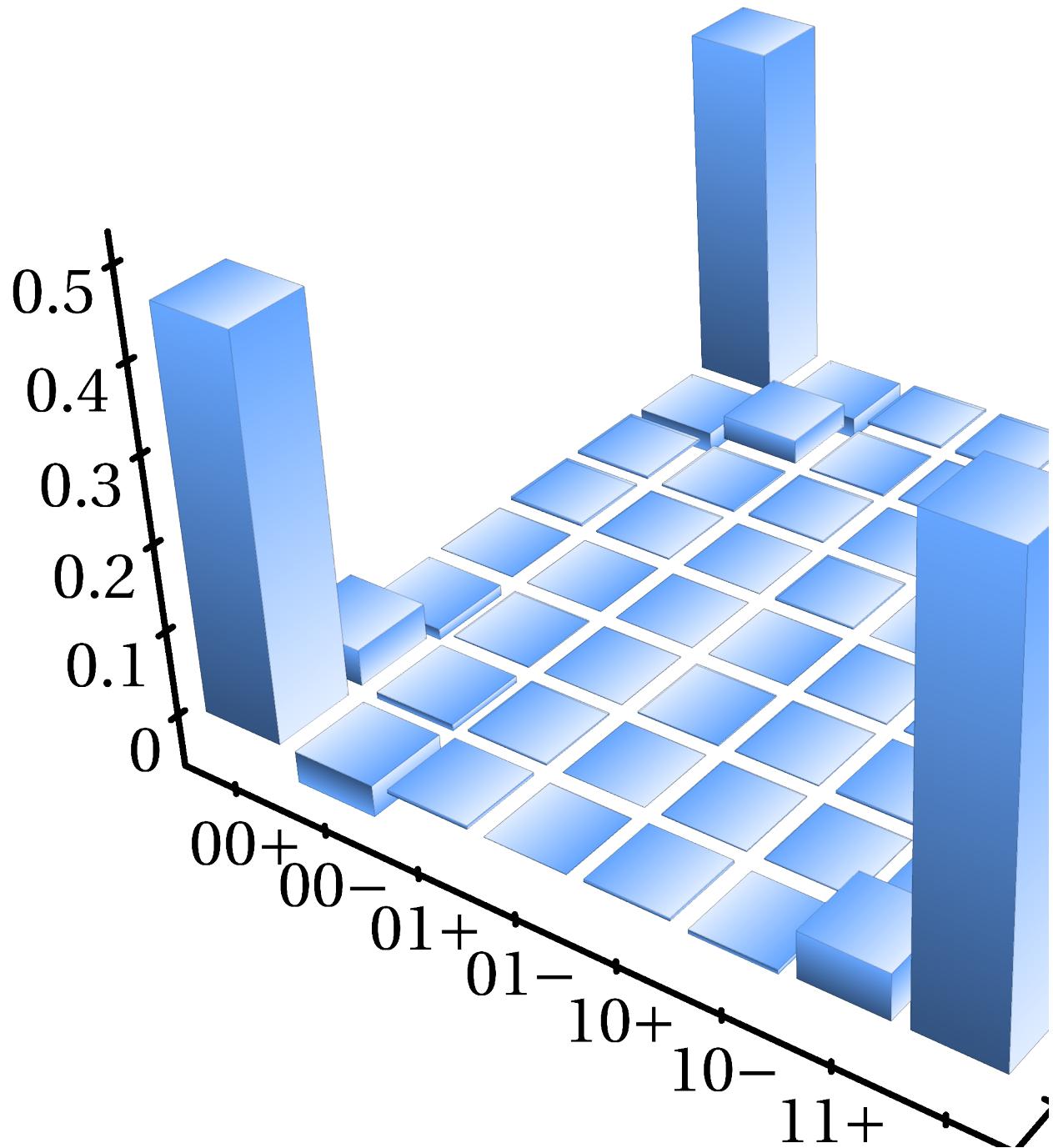
```

sizeimage = 1000;
sizefont = 40;
minzRe = -0.05; maxzRe = 0.521;
minzIm = -0.55; maxzIm = 0.53;
axesth = 0.0045;
spacing = 0.2;
persp = 1.2;
sizex = 0.012;
sizey = 0.010;
sizez = 0.010;
tickLabels = {"00+", "00-", "01+", "01-", "10+", "10-", "11+", "11-"};
zticksRe = {{0, 0.1, 0.2, 0.3, 0.4, 0.5}, {"0", "0.1", "0.2", "0.3", "0.4", "0.5"}, {0.01` , 0.01` , 0.01` , 0.01` , 0.01` }};
zticksIm = {{-0.5` , -0.25` , 0.` , 0.25` , 0.5` }, {"-0.5", "-0.25", "0", "0.25", "0.5"}, {0.01` , 0.01` , 0.01` , 0.01` , 0.01` }};
tickPositions = Table[i (1 + spacing) + 0.5, {i, 0, Length[RhoLCdIm] - 1}];

ticksRe =
Transpose /@ {{tickPositions, tickLabels, ConstantArray[sizex, Length[RhoLCdRe]]},
{tickPositions, tickLabels, ConstantArray[sizey, Length[RhoLCdRe]]}, zticksRe};
ticksIm = Transpose /@ {{tickPositions, tickLabels,
ConstantArray[sizex, Length[RhoLCdIm]]},
{tickPositions, tickLabels, ConstantArray[sizey, Length[RhoLCdIm]]}, zticksIm};

RhoLCdBarIMG =
Grid[{{BarChart3D[RhoLCdRe, ChartLayout → "Grid", ChartStyle → {RGBColor[0.4, 0.65, 1]}, 
ImageSize → sizeimage, ChartLabels → None, PlotRange → {minzRe, maxzRe}, 
BaseStyle → {FontSize → sizefont}, ViewPoint → {persp * 1.8, persp * 1.2, persp * 1.3}, 
AxesEdge → {{1, 0}, {1, 0}, {1, 0}}, Boxed → False, AxesOrigin → Automatic, 
Method → {"Canvas" → None}, ChartStyle → Opacity[1.0], 
BarSpacing → {spacing, spacing}, AspectRatio → 1, 
FaceGrids → None, Ticks → ticksRe, AxesStyle → Thickness[axesth], 
LabelStyle → (FontFamily → "Times"), Boxed → False, ImageSize → 400], 
BarChart3D[RhoLCdIm, ChartLayout → "Grid", ChartStyle → {RGBColor[0.4, 0.65, 1]}, 
ImageSize → sizeimage, ChartLabels → None, PlotRange → {minzRe, maxzRe}, 
BaseStyle → {FontSize → sizefont}, ViewPoint → {persp * 1.8, persp * 1.2, persp * 1.3}, 
AxesEdge → {{1, 0}, {1, 0}, {1, 0}}, Boxed → False, AxesOrigin → Automatic, 
Method → {"Canvas" → None}, ChartStyle → Opacity[1.0], 
BarSpacing → {spacing, spacing}, AspectRatio → 1, 
FaceGrids → None, Ticks → ticksRe, AxesStyle → Thickness[axesth], 
LabelStyle → (FontFamily → "Times"), Boxed → False, ImageSize → 400]}]}

```



```

Export["ghz_LCd.pdf", RhoLCdBarIMG];

(* Wave plates - WP *)

RhoDesRe = Table[NamDataRhoDesticky [[i]], {i, 2, 9}];
RhoDesIm = Table[NamDataRhoDesticky [[i]], {i, 13, 20}];
Dimensions [RhoDesRe]
Dimensions [RhoDesIm]

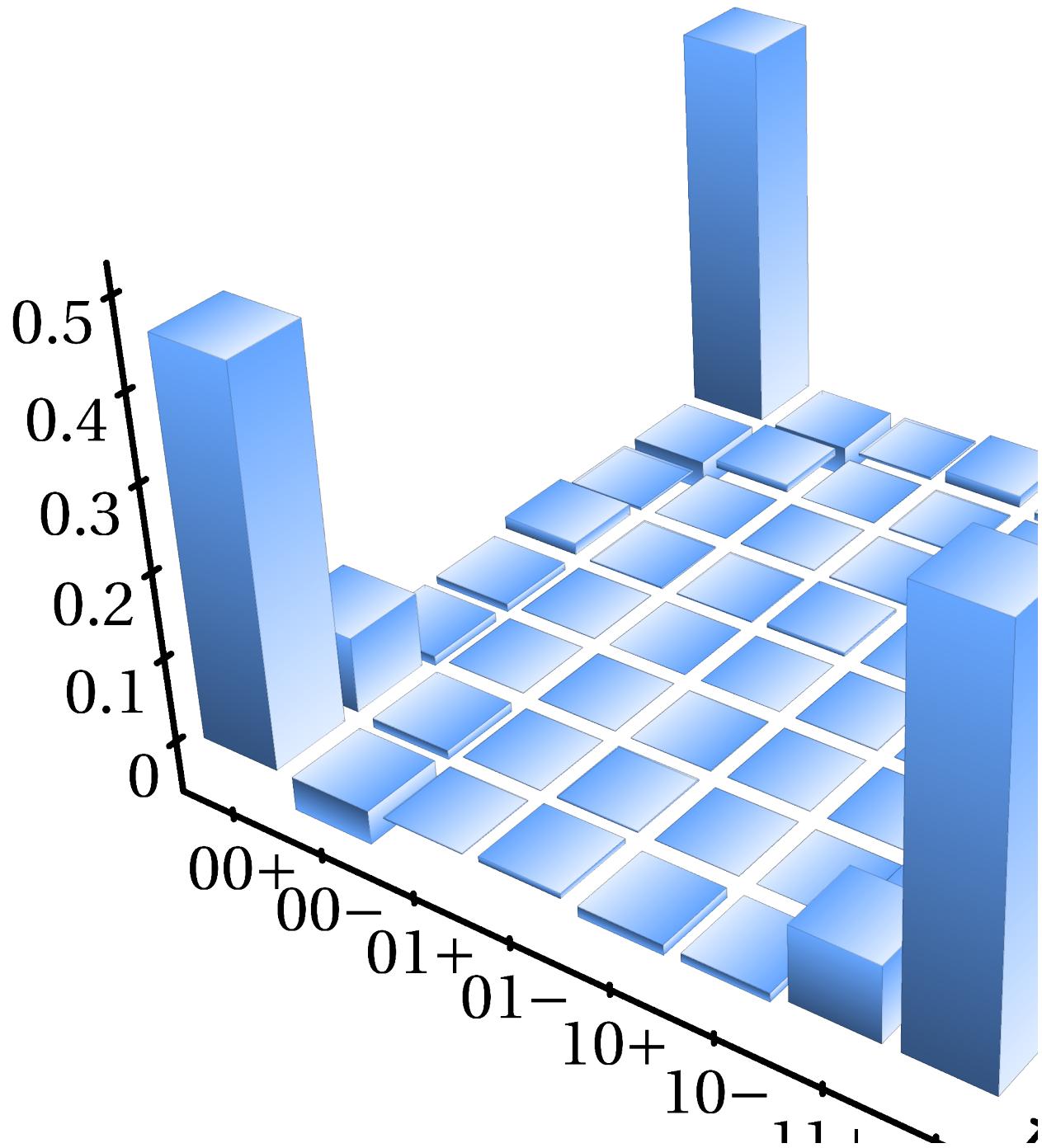
{8, 8}
{8, 8}

RhoDes = RhoDesRe + I * RhoDesIm ;
Fidelity [RhoDes , RhoIdeal]
0.935991

ticksRe =
Transpose /@ {{tickPositions , tickLabels , ConstantArray [sizex , Length[RhoDesRe ]]}, {tickPositions , tickLabels , ConstantArray [sizey , Length[RhoDesRe ]]}, zticksRe};
ticksIm = Transpose /@ {{tickPositions , tickLabels , ConstantArray [sizex , Length[RhoDesIm ]]}, {tickPositions , tickLabels , ConstantArray [sizey , Length[RhoDesIm ]]}, zticksIm};

RhoDesBarIMG =
Grid[{{BarChart3D [RhoDesRe , ChartLayout → "Grid", ChartStyle → {RGBColor[0.4, 0.65, 1]}, ImageSize → sizeimage , ChartLabels → None, PlotRange → {minzRe , maxzRe}, BaseStyle → {FontSize → sizefont}, ViewPoint → {persp * 1.8, persp * 1.2, persp * 1.3}, AxesEdge → {{1, 0}, {1, 0}, {1, 0}}, Boxed → False, AxesOrigin → Automatic, Method → {"Canvas" → None}, ChartStyle → Opacity[1.0], BarSpacing → {spacing , spacing}, AspectRatio → 1, FaceGrids → None, Ticks → ticksRe , AxesStyle → Thickness[axesth], LabelStyle → (FontFamily → "Times"), Boxed → False, ImageSize → 400], BarChart3D [RhoDesIm , ChartLayout → "Grid", ChartStyle → {RGBColor[0.4, 0.65, 1]}, ImageSize → sizeimage , ChartLabels → None, PlotRange → {minzRe , maxzRe}, BaseStyle → {FontSize → sizefont}, ViewPoint → {persp * 1.8, persp * 1.2, persp * 1.3}, AxesEdge → {{1, 0}, {1, 0}, {1, 0}}, Boxed → False, AxesOrigin → Automatic, Method → {"Canvas" → None}, ChartStyle → Opacity[1.0], BarSpacing → {spacing , spacing}, AspectRatio → 1, FaceGrids → None, Ticks → ticksRe , AxesStyle → Thickness[axesth], LabelStyle → (FontFamily → "Times"), Boxed → False, ImageSize → 400]}]}

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Export["ghz_WP.pdf", RhoDesBarIMG];

(* Ideal GHZ state *)

ticksRe =
  Transpose /@ {{tickPositions, tickLabels, ConstantArray [sizex, Length[RhoIdealRe]]},
    {tickPositions, tickLabels, ConstantArray [sizey, Length[RhoIdealRe]]}, zticksRe};
ticksIm = Transpose /@ {{tickPositions, tickLabels,
  ConstantArray [sizex, Length[RhoIdealIm]]},
    {tickPositions, tickLabels, ConstantArray [sizey, Length[RhoIdealIm]]}, zticksIm};

RhoDesBarIMG = Grid[
  {{BarChart3D[RhoIdealRe, ChartLayout -> "Grid", ChartStyle -> {RGBColor[0.4, 0.65, 1]},
    ImageSize -> sizeimage, ChartLabels -> None, PlotRange -> {minzRe, maxzRe},
    BaseStyle -> {FontSize -> sizefont}, ViewPoint ->
      {persp * 1.8, persp * 1.2, persp * 1.3},
    AxesEdge -> {{1, 0}, {1, 0}, {1, 0}}, Boxed -> False, AxesOrigin -> Automatic,
    Method -> {"Canvas" -> None}, ChartStyle -> Opacity[1.0],
    BarSpacing -> {spacing, spacing}, AspectRatio -> 1,
    FaceGrids -> None, Ticks -> ticksRe, AxesStyle -> Thickness[axesth],
    LabelStyle -> (FontFamily -> "Times"), Boxed -> False, ImageSize -> 400],
  BarChart3D[RhoIdealIm, ChartLayout -> "Grid", ChartStyle -> {RGBColor[0.4, 0.65, 1]},
    ImageSize -> sizeimage, ChartLabels -> None, PlotRange -> {minzRe, maxzRe},
    BaseStyle -> {FontSize -> sizefont}, ViewPoint ->
      {persp * 1.8, persp * 1.2, persp * 1.3},
    AxesEdge -> {{1, 0}, {1, 0}, {1, 0}}, Boxed -> False, AxesOrigin -> Automatic,
    Method -> {"Canvas" -> None}, ChartStyle -> Opacity[1.0],
    BarSpacing -> {spacing, spacing}, AspectRatio -> 1,
    FaceGrids -> None, Ticks -> ticksRe, AxesStyle -> Thickness[axesth],
    LabelStyle -> (FontFamily -> "Times"), Boxed -> False, ImageSize -> 400}}}]

```



